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BLACKLOCK (D. B.) & GORDON (R. M.). **The Experimental Production of Immunity against Metazoan Parasites, and an Investigation of its Nature.**—*Lancet.* 1927. Apr. 30. pp. 923–925. [6 refs.]

The immunity here predicated is emphatically not to be confused with a mere toleration of a usually noxious parasite, or with an immunity acquired by age; but is a potent immunity acquired as the result of previous infection, and destructive of the specific parasite.

The parasite in this instance is the larva of the African tumbu fly (*Cordylobia anthropophaga*), an "obligatory" parasite of certain mammals (including man), to the natural history of which the senior author, in collaboration with THOMPSON, has already made a most sufficing contribution (see this *Bulletin*, Vol. 21, p. 150). In order to develop, the larva after leaving the egg has sooner or later to penetrate into the subcutaneous tissue of a living host where it feeds until it is full grown (usually about a week) when it leaves its host in order to pupate.

The experiments of which the remarkably interesting results are here recorded as a succinct preliminary communication were carried on at Sierra Leone; in their course 58 guineapigs (some imported and some local) were used as hosts and 1,650 Cordylobia-larvae of the first instar, the latter in every case being kept under daily observation for a term of six days after being placed upon the skin of a host.

Of 472 larvae placed upon the guineapigs at their *first* experimental infection 231 (49 per cent.) survived to the 6th day; whereas of 1,178 larvae put on at *all subsequent* applications combined, only 78 (7 per cent.) survived to the 6th day. Local guineapigs were much less susceptible to first infection than the guineapigs imported from England (33 per cent. susceptible against 59 per cent.). All this is evidence of a great degree of immunity acquired by previous infection.

The immunity thus acquired is not a general immunity, but is a local immunity parallel, as the authors do not fail to observe, with BESREDKA'S *immunité générale par immunisation locale* in bacteriology (see this *Bulletin*, Vol. 20, p. 678, and Vol. 21, p. 478). No antibodies were to be found in the serum of immunized animals; the injection of blood of immune animals did not impart immunity to non-immune animals; the blood of immunes exhibited no adverse influences or

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larvicidal properties *in vitro* ; complement-fixation and precipitin tests were negative. Moreover intraperitoneal and subcutaneous injection of an emulsion of larvae conferred no immunity—rather the reverse.

Furthermore the immunity is at first localized in that particular area of the skin where it was acquired ; it persists there for at least 3 months (limit of present investigation) and spreads from that area. Larvae penetrating an immune area are, in the majority of cases, dead within 40 hours, while they are still in the superficial non-vascular layers of the skin. Immune skin grafted on a non-immune animal retains and imparts its immunity ; and, conversely, a skin-graft from a normal animal acquires immunity when planted in an immune area. Immunity is reproduced in the new skin that re-covers a denudation of an immune area. Moreover skin-reactions (swelling and redness) are observed only when larvae are penetrating an immunized area of skin.

As suggesting some influence of the circulating fluids apart from local tissue the author noticed larvae still present in living " immune " skin continued to live when the skin was removed and kept at room or at incubator temperature—and lived as long as larvae lying in normal skin so treated.

Both mechanical damage to and malnutrition of the skin were excluded from the causation of these phenomena of immunity. Attempts to break it down, once established, failed.

Though intraperitoneal and subcutaneous injections, as has been said, failed to produce immunity, some success in the artificial production of immunity was obtained when larvae were permitted to penetrate the skin and were then removed, and also by application of emulsions of larvae to the skin.

" Owing to the prominence which is often given to the occurrence of eosinophilia in many infections with metazoan parasites, we attempted to come to some conclusion as regards its significance in immunity to such parasites. In each case our percentage of eosinophils was derived from a count of a thousand leucocytes, and this part of the investigation involved the differential counting of nearly a hundred thousand leucocytes. The conclusions reached were as follows :—

" (*a*) Metazoan infection is not invariably accompanied by eosinophilia.

" (*b*) Immunity against a metazoan parasite may develop without the occurrence of eosinophilia, either general or local.

" (*c*) Intense eosinophilia, either general or local, may exist without any immunity being present.

" (*d*) Intraperitoneal injections of emulsions of third instar larvae reduce the eosinophil percentage.

" (*e*) Subcutaneous injections of, and applications to the scarified skin of, third instar larvae as emulsions increase the eosinophil percentage."

A. Alcock.

LAMBORN (W. A.). **Medical Entomologist's Annual Report for 1925.**—*Nyasaland Protectorate Ann. Med. Rep. for Year ending 31st Dec. 1925.* Appendix I. pp. 28–29.

Lamborn reports on the final outcome of his field experiment to control *Glossina morsitans* in Nyasaland by the agency of the parasitic Hymenopteron *Syntomosphyrum glossinae.* In the earlier stage of his experiment a liberal distribution of the parasite in an extensive area had been followed by a striking increase of parasitized Glossina-puparia in that area. Later observations afforded evidence that Nature was restoring the balance in favour of the fly. " A very fascinating

possibility of effecting the control of the fly had been explored, which by itself had hardly proved radical enough, though it might have distinct value as an adjunct to other measures."

The value of prolonged adminstration of arsenic—both by systematic dipping and by way of mouth—to domestic animals as a means of "protective-offence" against tsetse-fly and other blood-sucking arthropods was tested experimentally. The results were quite disappointing.

A survey was made of a tract into which during the past twelve years tsetse-fly has been steadily advancing from Rhodesia, and a programme has been prepared for the treatment of this tract in the manner associated with the name of SWYNNERTON.

Further study of the malaria problem corroborates the conclusion that the annual epidemic is primarily due to a very distinct seasonal increase of *Anopheles costalis* towards the end of the rainy season.

A study of the amount and kind of malaria prevailing at various altitudes among the native population has begun, and, along with it, of the topical distribution of anopheline mosquitoes.

Among other items of mosquito bionomy it is observed that *Stegomyia fasciata* can live and breed on a diet of reptile blood.

The above are the principal items of an interesting and admirably clear and succinct report.

A. A.

GILL (C. A.). **Zoological Nomenclature in Medical Literature.** [Correspondence.]—*Brit. Med. Jl.* 1927. Feb. 19. p. 354.

The writer of this letter protests very pungently against the idolatrous observance of the law of priority in zoological nomenclature within the less fastidious precincts of medical parasitology. As a glaring instance of disrespectful inconvenience he cites the obliteration of the agreeable, familiar, and significant name "Anopheles rossii" by "Anopheles subpictus"—a resuscitated obscurity.

A. A.

NEVEU-LEMAIRE (M.). Essai de mammalogie médicale. I. Les mammifères réservoirs de virus des maladies infectieuses de l'homme. [**Mammalian Reservoirs of Viruses of Diseases Infective to Man.**]—*Ann. Parasit. Humaine et Comparée.* 1927. Apr. 1. & July 1. Vol. 5. Nos. 2 & 3. pp. 143–176; 252–278. [76 refs.] [Faculty of Med., Paris.]

This compilation is the concluding instalment of a catalogue of mammals that are known [to the compiler's satisfaction] to be capable of harbouring microorganisms pathogenous to man. The species are grouped in zoological order and include here the Orders Carnivora, Insectivora, Chiroptera and Primates. The compilation also includes a list, in alphabetical order, of *all* such mammals, and the specific human viruses harboured by each; and, conversely, a list of microorganisms pathogenous to man, and their specific mammalian correspondents; and, finally, a bibliography. This last item considerably increases the value of a compilation which, however, in the present state of our knowledge cannot be comprehensive and must be unripe for compendious treatment.

A. A.

McCulloch (W. E.). **The Incidence of Amoebic and Helminthic Infections in Kano and Katsina Cities, Northern Nigeria.**—*Jl. Trop. Med. & Hyg.* 1927. May 2. Vol. 30. No. 9. pp. 117–119.

Kano is an industrial city of 68,000 inhabitants: Katsina with 17,500, 108 miles away, is agricultural. The author examined 500 natives from 3 groups in Kano, cooks in the Native Administration Prison, prisoners in the Protectorate Prison and inmates of the Native Hospital, in all 149, and 351 patients from the Katsina Native Hospital; none had symptoms pointing to helminthic infection. One stool only was collected, after mag. sulph. if necessary. Two smears in Weigert's iodine solution were examined, one of the surface, the other of the interior of the stool. Faeces negative for ova were re-examined by concentration in strong saline. Tables I and II give the results.

TABLE I.

Results in the Kano Series with Regard to Amoebic Infections.

	Kano N.A. Prison.	Kano Protectorate Prison.	Kano Native Hospital.	Totals.
Number examined ...	60	38	51	149
	per cent.	per cent.	per cent.	per cent.
Entamoeba histolytica ...	56·6	23·7	21·6	36·24
E. coli	23·3	42·0	31·3	28·2
Endolimax nana	10·0	—	2·6	4·7

TABLE II.

Percentages of Infections in Kano and Katsina Cities.

	Kano.	Katsina.
Number of people examined ...	149	351
	per cent.	per cent.
Entamoeba histolytica	36·24	11·96
E. coli	28·20	50·70
Endolimax nana	4·70	6·00
Ankylostomata	48·32	70·00
Taenia saginata	8·00	10·00
T. solium	—	0·28
Ascarides	14·90	23·60
Strongyloides	2·70	4·81
Schistosoma mansoni	2·00	0·85
S. haematobium	—	0·85

The high figure for *E. histolytica* in the N.A. Prison is explained by the fact that there had been a recent outbreak of amoebic dysentery. Comparing the Kano and Katsina figures the high ancylostomiasis record at Katsina is attributable to the heavy farming that goes on within the city walls; moreover the wearing of sandals is more frequent in the wealthier Kano. Ascaris infection also is commoner in Katsina. Kano on the other hand has the pre-eminence in histolytica infection. *T. solium* infection is rare because the people are Mohammedan, but *T. saginata* is practically universal; much of the meat eaten is in the

raw state. Thick film blood preparations of 164 cases revealed microfilaria in one instance only. Guineaworm infestation is common in both towns; "a really successful mode of treatment has yet to be found." In his conclusions the author indicates the futility of generalizing as to the percentage infestation of a country from a few cases in one town, and notes that Europeans in Mohammedan areas should have their servants examined for cysts of *E. histolytica*, for in the epidemic mentioned a European master contracted infection from his cook.

The author's account of a peculiar feature of 17 cases of ancylostomiasis will be noticed in its appropriate place.

A. G. B.

FEDULOW (A. W.). [Ueber die Verbreitung der Darmprotozoa in Turkestan.] [**Distribution of Intestinal Parasites in Turkestan.**]—*Pensée Médicale d' Usbekistane.* Taschkent. 1926. Vol. 1. No. 1. pp. 5–11. [12 refs.] [In Russian.]

In stools from 100 diarrhoeic cases in the hospitals of Tashkent, the author found the following Protozoa :—

	per cent.		per cent.
Entamoeba histolytica, active	6	*Endolimax nana*	4
Entamoeba histolytica, cysts	2	*Trichomonas intestinalis* (= *T. hominis*	26
E. coli, active	9	*Chilomastix mesnili* ...	8
E. coli, cysts...	5	*Giardia intestinalis*	14
"*E. hartmanni*"	16	*Prowazekia* (= *Bodo*) ...	14
"*Entamoeba*, n. sp." ...	4	*Balantidium coli*	2
Vahlkampfia	2	*B. minutum*	1

Iodamoeba and *Dientamoeba* have never been observed.

"*Entamoeba* n. sp.," described by the author elsewhere, is here defined as follows. Size 12–13μ. Peripheral chromatin arranged in the nucleus in the form of two crescents connected by a fine chromatic filament. Karyosome very small (punctate). "Chromidial masses" absent in active forms. Cysts uninuclear, with glycogen vacuole. [As this amoeba is said to be allied to "*E. hartmanni*," it would appear that, like the latter, it is another name for *E. histolytica*. The author, however, emphasizes the independence of both these forms.]

"*Balantidium minutum*," is said to differ from *B. coli* in general dimensions and in the greater length of its "cytostome" [peristome?].

C. A. Hoare.

TER-MATEVOSIANTS (S. M.). [**On the Incidence of Intestinal Protozoa among the Inmates of a Home for Children.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 2. pp. 83–94. [In Russian.]

Reports of examinations of faeces of 83 such children in Erivan (Armenia). A single examination revealed Protozoa in 55·4 per cent.; on re-examination the percentage rose to 72·3. No clinical symptoms were observed in any of them. The findings were distributed as follows :—

	per cent.
Entamoeba coli (cysts and precystic)	42·2
E. histolytica (cysts and precystic)	20·5
Endolimax nana (active and cysts)	18·0
Giardia intestinalis (active and cysts)	24·0
Trichomonas intestinalis [=*hominis*] ...	16·8

C. A. Hoare.

UKIL (A. C.). **An Analysis of 1200 Samples of Stools received at the Laboratory, Calcutta.**—*Calcutta Med. Jl.* 1927. Jan. Vol. 21. No. 7. pp. 346–347. [1 ref.]

This analysis of 1,200 samples of stools [number of individual examinations not stated] showed the following results :—

Blood and mucus were present in 254. *E. histolytica* was found in 187 (associated with other organisms in 35 of them). Charcot-Leyden crystals in 25. Trichomonas and Tetramitus in 115. *Giardia intestinalis* in 79, and with other associations in 7 more. Shiga bacillus in 43. Flexner bacillus in 13. *B. typhosus* was isolated in 6, and *B. paratyphosus* A in 1. Other Gram-negative and lactose-non-fermenting bacilli in 120, of which 105 were isolated from typical cases of acute bacillary dysentery, 10 from chronic or subacute cases, and 5 from stools of normal appearance. Streptococci and enterococci in 55. Yeast cells in 15. *Ankylostoma duodenale* in 10. *Ascaris lumbricoides* in 8. *Trichocephalus dispar* in 5. *Oxyuris vermicularis* in 3. Strongyloides in 1. *Taenia saginata* in 1. *Hymenolepis nana* in 2, and *H. diminuta* in 1.

A. A.

UKIL (A. C.). **The Naked Eye and Microscopic Appearance of Stools containing Flagellates.**—*Calcutta Med. Jl.* 1927. Jan. Vol. 21. No. 7. pp. 348–349. [4 refs.]

This note is based on an examination of 201 samples of stools in which by critical search flagellates *alone* could be found.

In 115 instances the only organisms to be found were of "the Trichomonas and Tetramitus group." In 59 of these 115, the stool was an offensive, light-greenish-yellow liquid inspissated with mucus, and contained some pus cells and (in 12 cases) red blood cells ; in 14 others it was merely a yellowish liquid ; in 28 others it was merely soft or semi-liquid ; in 7 others it was soft and contained mucus and few pus or red blood cells ; and in 7 it was "formed."

In 79 instances the only organism to be found was *Giardia intestinalis*. In 13 of these 79 the stool was "formed" ; but the characteristic stool in the majority was soft, greyish-white, and pultaceous or (12 cases) frothy ; pus was present in 4, mucus and pus in 9, and red blood cells in 2.

The author has merely analysed the stools as received in the laboratory, and reserves his opinion as to their pathogenous significance.

A. A.

PAULSON (Moses) & ANDREWS (Justin M.). **The Detection and Incidence of Human Intestinal Protozoa by the Sigmoidoscope.**—*Jl. Amer. Med. Assoc.* 1927. June 11. Vol. 88. No. 24. pp. 1876–1879. [8 refs.]

Comparing results between faeces obtained by sigmoidoscope and by defaecation the authors found the incidence of intestinal Protozoa to be from 2½ to 3½ times higher by sigmoidoscope, and they therefore advocate the use of this instrument in examinations for parasites. The parasites observed were *Entamoeba coli, Iodamoeba williamsi,*

Endolimax nana, Giardia (Lamblia), *Chilomastix mesnili,* and *Trichomonas hominis* ; the absence of *E. histolytica* being emphasized. The occulting effects of barium sulphate in these examinations of faeces are noted, and the value of supplemental serum-saline-citrate culture for flagellates.

A. A.

DESCHIENS (R.). Sur les protozoaires intestinaux des singes. [**Intestinal Protozoa in Monkeys.**]—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 19–23 [1 ref.]

This author has found intestinal Protozoa in 70 per cent. of the monkeys he has examined and in every one of 7 chimpanzees, amoebae being found more often than flagellates. Among finds that he believes to be novel are Endolimax, Chilomastix (a variety of *C. mesnili*) and *Trichomonas anthropopitheci* (n. sp.) in the chimpanzee ; Giardia in Macacus ; and Endolimax and Giardia in Cercopithecus.

A. A.

TALIAFERRO (William H.). **Host Resistance and Types of Infections in Trypanosomiasis and Malaria.**—*Quarterly Rev. Biol.* 1926. Apr. Vol. 1. No. 2. pp. 246–269. With 8 text figs. [53 refs.]

This paper is a long argument described by the author as " essentially a summary " ; here, therefore, no more can be done than follow the line of argument.

The author's desire is to investigate the processes of acquired immunity as they can be followed by observations of the parasite—a line of study feasible in certain trypanosomes and plasmodia that " complete their life-cycle in the blood." When such parasites invade the blood, if they meet with no resistance they may be assumed to increase in geometrical progression. But the host may resist either by killing some of the parasites as they are formed, or by checking their rate of multiplication—or, as the author terms it, " reproduction." The first method of resistance can be estimated by serial observations of the numbers of the parasites ; the other method by observations of their mean size. In the rat, for instance, *Trypanosoma lewisi* encounters both kinds of resistance, the direct, phagocytic or, more probably, trypanocidal, resistance being manifested in recurrent " number crises " ; but each number crisis is so much gained by the host because the rat first produces an antibody which completely inhibits reproduction (cell division) in the parasites. The case of *T. lewisi* thus, it is thought, may help to explain how a pathogenous trypanosome like *gambiense* may remain a harmless convival of the antelope and be pathogenous to other hosts even although those hosts can produce a trypanolysin ; for all the parasites will not be killed by the trypanolysin and those that remain can continue, in the absence of a " reproduction-inhibiting reaction product," to reproduce at a uniform rate.

" In the malaria parasite of birds a marked parasiticidal effect of resistance is manifested both at definite number crises and throughout the latter part of the infection. This is, however, not associated with any inhibition of the reproduction of the parasites. The immunological basis for the parasiticidal effects are not definitely known."

A. A.

WOLFF (Etienne). Un facteur de l'enkystement des amibes d'eau douce. Prolongation expérimentale de la période végétative. [**A Factor of Encystment of Fresh Water Amoebae.**]—*C.R. Soc. Biol.* 1927. Mar. 11. Vol. 96. No. 9. pp. 636–638. With 1 text fig.

The experiments here quite insufficiently described were designed to give some precision to the postulate that encystment of free Protozoa is a reaction to unfavourable circumstances, particularly to inanition. In " pure " cultures of a species of freshwater amoeba (Hartmanella) upon a nutritive medium containing a bacterium of the *fluorescens* group, encystment of the amoeba began in 10 to 15 days and became general several weeks afterwards ; but if the amoebae were starved—by changing the nutritive medium for sterile water at the 7th day of culture—encystment was much hastened. On the other hand by frequent renewal of the nutritive medium, without removing the sterile water (which is now required to exercise its purifying effect) encystment could be retarded for a long time.

A. A.

ALLEN (Ena A.). **Excystment of** *Councilmania lafleuri* **Kofoid and Swezy in Culture in Vitro.**—*Univ. California Public Zool.* 1926. Oct. 4. Vol. 29. No. 8. pp. 175–178. With 28 text figs. [5 refs.]

The excystment of " *Councilmania lafleuri* " is here described and figured. " Excystment took place in Ringer's solution plus 0·1 per cent. of dextrine only, and not in any of the other media used." In sediment from two subcultures some empty cysts, showing the typical " pore " were seen.

A. A.

WENRICH (D. H.) & YANOFF (Jacob). **Results of Feeding Active Trichomonad Flagellates to Rats.**—*Amer. Jl. Hyg.* 1927. Mar. Vol. 7. No. 2. pp. 119–124. [8 refs.]

Employing HEGNER's methods, the authors observed that from rats fed with caecal matter containing active flagellates taken from other rats the active flagellates could be recovered, from one to two hours afterwards, in the stomach and intestine. They conclude, therefore, that these flagellates (a " Pentatrichomonas " and 3 species of " Tritrichomonas ") can infect fresh hosts without undergoing encystment ; and since they cannot distinguish the " Pentatrichomonas " of the rat from that of man they also conclude that the rat may be regarded as a reservoir for man.

A. A.

PAVIA (Giovanni). *Trichomonas intestinalis—buccalis—vaginalis.* Loro eventuale patogenicita. [**Species of Trichomonas: their Pathogenicity.**]—*Arch. Ital. Sci. Med. Colon.* 1926. Nov.-Dec. Vol. 7. No. 11–12. pp. 227–239. [23 refs.]

This is a good review of a familiar ground. The author has no doubt that *Trichomonas intestinalis* is pathogenous. He recites the associated symptoms, and recommends stovarsol, yatren, and turpentine in treatment. He is not quite so certain of the pathogeny of *T. buccalis* and *vaginalis.*

A. A.

MARX (Hans). Ueber den pathologisch-anatomischen Nachweis von Trichomonas pulmonalis bei putrider Bronchitis. [**Presence of T. pulmonalis in Putrid Bronchitis.**]—*Schweiz. Med. Woch.* 1927. May 21. Vol. 57. No. 21. pp. 487–488. [5 refs.]

The author describes the pathological findings in a fatal case of putrid bronchitis with other pulmonary complications in which Trichomonas had been present in the sputum. His verdict is that the flagellate had no pathological significance; possibly its first entry might have occurred a few days before death.

A. A.

INFURNA (Giuseppe). Frequenza dei flagellati intestinali specialmente negli adulti in provincia di Bologna. Loro eventuale patogenicità. [**Frequency of Intestinal Flagellates in Adults of the Province of Bologna.**]—*Arch. Ital. Sci. Med. Colon.* 1926. Sept.-Oct. Vol. 7. No. 9–10. pp. 185–201. [11 refs.]

In 2,883 specimens of faeces examined, from Bologna and provinces, *Giardia intestinalis* was found in 4·85 per cent. of cases, being associated with other common intestinal parasites in 2·53 per cent. The author considers Giardia to be pathogenous for man, causing abdominal pains, anaemia, and diarrhoea often alternating with constipation. The treatment is stovarsol in doses of 0·50–0·75 gm. daily for 15–20 days. Among the 2,883 cases *Trichomonas intestinalis* was present in 4·49 per cent., being associated with other organisms in 3·96 per cent. The author thinks that it also is to a certain extent pathogenous—especially when it is abundant—in the same way as, though less troublous than, Giardia. *Chilomastix mesnili*, which was found in 3·25 per cent. of the 2,883 cases, he considers distinctly pathogenous because it can eat red blood cells. In treating these two infestations he recommends, in addition to familiar internal remedies, washing out the gut with medicated enemata. [Beyond the local statistics there is nothing very novel here.]

A. A.

ZAHORSKY (John) & MCLOON (Mary). **Giardiasis in Children. Report of Three Cases.**—*Jl. Amer. Med. Assoc.* 1927. Feb. 5. Vol. 88. No. 6. pp. 385–388. [13 refs.]

Three cases are here reported—a boy of 6 years, and twin-four-months' infants that apart from the breast had been fed only with sweetened condensed milk—where the stools contained Giardia cysts. In the first case there was diarrhoea, in the other two cases there was first diarrhoea and then constipation and the stools also contained pus cells. The reporters hold that "Giardiasis has a definite clinical importance, since the Giardiae in infants and young children produce a distinct irritation of the intestinal tract which may result in malnutrition and secondary intestinal infections." After earlier ineffectual treatment the reporters adopted WENYON's device of bismuth salicylate and found it "effective in improving the clinical condition"; the cysts also disappeared.

A. A.

HEGNER (Robert). **Excystation and Infection in the Rat with** *Giardia lamblia* **from Man.**—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 433–447. With 18 figs. [9 refs.] [Sch. of Hyg. & Pub. Health, Johns Hopkins Univ.]

The following summary by the author expresses very concisely the range and the results of the experiments described in this paper:—

"*Excystation.* The available descriptions of excystation in any species of giardia are the somewhat inconclusive accounts of Simon (1921) and Hegner (1925) of *G. lamblia* in the feces of a human host.

"Twenty-eight rats were used in the experiments described. From 3 cc. to 6 cc. of washed cysts of *G. lamblia* from man, were injected into the stomach of rats from 30 to 70 hours after they were passed in the feces. The rats were killed and examined from 20 minutes to 4½ hours after being injected.

"In two rats, full-sized *lamblia*-like giardias were found; these could not have been newly excysted specimens and hence probably belonged to the species called by Lavier (1924) *Giardia simoni*. *G. simoni* is probably the same species as *G. lamblia*.

"The minimum time required for excystation to occur under the conditions of the experiments was about 30 minutes.

"Excystation did not occur in the stomach or duodenum, but mostly from 30 cm. to 60 cm. posterior to the stomach. The excysted specimens appeared to remain in this location whereas unexcysted cysts were carried down to the caecum.

"Not all of the cysts injected excysted; those that did not were probably immature or dead.

"The factors that are responsible for excystation probably include a temperature of about 37° C. and moisture, and possibly certain digestive juices.

"The process of excystation appears to be as follows: The organism is stimulated to activity within the cyst; the cyst wall weakens at the posterior end; the posterior flagella break through at this point and by their activity draw the rest of the organism out of the cyst wall.

"Division of the organism into two begins before excystation and is completed afterward. The nuclei within the cyst are 4 in number located at one end; the axostyles and other internal structures are duplicated; division begins at the anterior end and proceeds posteriorly; the pairs of nuclei do not separate and become located at opposite ends before division as previously described. The young trophozoites are smaller than fully-grown specimens; they are at first irregular in shape; later they assume the adult shape and a sucking disc appears.

"*Infection.* Previous attempts by Simon (1922) and Lavier (1924) to infect rats with *G. lamblia* from man have been unsuccessful.

"Ten rats were fed washed cysts of *G. lamblia* from man on 11 of 12 successive days, and killed at intervals during the succeeding 19 days.

"Temporary infections were apparently established in 4 rats; these infections were highest on the 6th and 7th days, decreased by the 12th and 14th days, and disappeared by the 16th and 19th days. The trophozoites recovered from these animals were smaller than those of *G. lamblia*; this may have been due to their unusual habitat.

"The distribution of the giardias differed from that of *G. muris*; the latter are most abundant in the duodenum, whereas the trophozoites of *G. lamblia* were absent from the duodenum and most numerous in the small intestine from 40 cm. to 90 cm. posterior to the stomach.

"No cysts were passed by the experimentally infected rats, which indicates that *G. lamblia* does not encyst in the rat; the rat is, therefore, not an important transmitting agent of this species."

A. A.

PESSOA (Samuel B.) & CORRÊA (Clovis). Sobre a disseminação de cystos de *Giardia intestinalis* (Lambl.) pelas baratas. [**Dissemination of Giardia Cysts by Cockroaches.**]—*Rev. Biologia e Hyg.* São Paulo. 1927. Vol. 1. No. 1. pp. 90–92. English summary p. 93. [7 refs.]

Three species of cockroaches are common at S. Paulo, two of them being the small " German " cockroach and the large red " American " cockroach. These insects both in the larva and adult stages can distribute living cysts of *Giardia intestinalis* by defaecation, and also by regurgitation (experimentally). A few live cysts could be found even 7 days after their ingestion, though the greatest number was found 48 hours after ingestion.

A. A.

ADAMOWICZ (Pawet). [Sur l'infection du duodénum et des voies biliaires par " Lamblia intestinalis."] [**Duodenal Infestation by** *L. intestinalis.*] —*Polskie archiwum medycyny wewnetrznej.* 1926. Vol. 4. p. 2. [Summarized in *Bull. Inst. Pasteur.* 1927. May 15. Vol. 25. No. 9. pp. 428–429.]

In 57 cases where he examined the contents of the duodenum the author recognized *Giardia intestinalis* in 7. In 5 of these seven there were biliary troubles ; in 1 there was chronic enteritis ; and in 1 pernicious anaemia without any manifest disturbance of the digestive tract. In only one of these cases was any evidence of the Giardia infection discovered in the faeces—cysts. This last fact makes it imperative, in the author's opinion, to examine the contents of the duodenum in cases of chronic diarrhoea with concomitant symptoms of hepatic or intestinal derangement.

As regards the presence of Giardia in the bile channels, the author thinks that although they do not cause any appreciable anatomical changes they may obstruct the ducts mechanically by their very multitude, and in nervous subjects may cause pain and spasms by their movements, and that in the gall-bladder their dead bodies may favour the formation of concretions.

A. A.

SOFIEW (M. S.). Ueber duodenitis bei Darm-Lambliose. [**Duodenitis in Gut Lambliasis.**]—*Pensée Méd. d' Usbekistane.* Taschkent. 1927. Vol. 1. No. 3–4. German summary p. 228. [In Russian pp. 28–30. With 2 text figs.]

An obstinate recurring case of intestinal lambliasis with pain in the epigastrium and symptoms of gastritis ; palpation caused sharp pain in duodenal region' In the duodenal contents were found numerous pus cells, much mucus, and many Lamblia free and encysted. A combination of emetine, neosalvarsan, and methylene blue therapy was followed by distinct improvement, but Lamblia cysts persisted in duodenal contents. Nine months later the patient returned with recurrence of former symptoms and physical signs, and with Lamblia in duodenal contents and in faeces.

H. M. H.

JASSINOWSKY (M. A.). Ueber die Anzahl der Parasiten bei der Lambliose der Kaninchen. [**On the Numbers of the Parasites in Lambliasis of the Rabbit.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Apr. Vol. 31. No. 4. pp. 191–193.

In the course of an investigation of the wandering of the leucocytes in the intestinal tissue of the rabbit some subsidiary observations were made

of the number of parasites present in the gut of an animal found to be infested with Lamblia (Giardia). A piece of the lower part of the *jejunum* 17 cm. long was isolated and washed out (five successive measured washings each of 5 minutes duration) in the manner here described in detail and the total number of parasites is calculated from observation of the number counted in 1 cmm. of each washing. The number was 37,625,000, of which 10,830,000 were calculated in the first measured washing. From the normal relations of the leucocytes in this case it is inferred that the rabbit was not suffering from any disease.

A. A.

DA FONSECA (O.). Sobre o flagellado "*Enteromonas hominis.*" [**The Flagellate** *Enteromonas hominis.*]—*Bol. Inst. Brasileiro de Sci.* Rio de Janeiro. 1927. Apr. 24. Vol. 2. No. 12. pp. 363–365. With 7 figs.

A brief description of the multiplication of this flagellate by binary fission is given, with illustrated figures. The hypothesis that they might be young forms of Chilomastix is held to be inadmissible, because they are frequently encountered in individuals harbouring no other protozoal species.

H. Harold Scott.

RODHAIN (J.). Phytoflagellé du latex d'une asclépédiacée Congolaise. [**Flagellate of a Congolese Asclepiad.**]—*Ann. Soc. Belge de Méd. Trop.* 1926. Dec. Vol. 6. No. 3. pp. 271–274. With 1 text fig. [4 refs.]

Description and figures and list of localities of observation of a Leptomonas (akin to the *L. elmassiani* observed in an American Asclepias) of common occurrence in an African Asclepiad, *Daemia extensa.*

DICKINSON (R. F. O'T.). **A Plant Flagellate in Mauritius.**—*Jl. Roy. Army Med. Corps.* 1927. June. Vol. 48. No. 6. pp. 454–455.

Reports the finding in the latex of *Euphorbia pillulifera* in Mauritius of a flagellate apparently identical with the one found by R. P. STRONG in the same species of Euphorbia in tropical America. Quotes the results of STRONG's experiments with this flagellate (see this *Bulletin*, Vol. 22, p. 275).

AUBERTOT. La flagellose des euphorbes dans l'Est de la France. [**Flagellosis of Euphorbias in the East of France.**]—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 14–19. [12 refs.]

The author has found Euphorbias infected with *Leptomonas davidi* in all parts of France where he has looked for it. The latex of infected plants is usually poor in amidon grains, but the plants do not show any outward and visible signs of infection. Phytophagous Hemiptera are always concurrent.

A. A.

MONASTRA-ABATE. Distribuzione del *Trypanosoma lewisi* nei ratti di diverse località di Bologna e Dintorni. Ricerca di eventuali altri parassiti. [**Distribution of** *T. lewisi* **in Rats from Different Districts of Bologna and its Environment ; Examination for other Parasites.**]—*Arch. Ital. Sci. Med. Colon.* 1927. Mar. Vol. 8. No. 3. pp. 131–149.

Sixty-three sewer rats were examined and 22 were parasitized. *T. lewisi* was found alone in 14, with helminths in 3, with Haemogregarines

in 1 ; Helminths alone 1, with haemogregarines 1 ; haemogregarines alone in 2. The last-named were found in the leucocytes. Helminthic infections were *Cysticercus fasciolaris*, *Hymenolepis diminuta*, *Trichocephalus dispar* and *Oxyuris vermicularis*. *Gongylonema* was looked for but not found.

H. Harold Scott.

ANDREWS (Justin M.). **Host-Parasite Specificity in the Coccidia of Mammals.**—*Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 183–194. [15 refs.]

The following are the author's conclusions from study and from certain experiments of his own :—

" *Isospora felis* and *I. rivolta* from the cat and dog appear to be infective to both animals, though the course of the infection varies in each." With this exception " the coccidia of mammals seem to be strictly host-specific parasites, as judged by cross-infectivity experiments on cats, dogs, rabbits, skunks, opossums, pigs, and prairie-dogs." Excystment " is facilitated by the digestive processes of the natural host . . . but in the foreign host oocysts are so resistant to digestive action that the sporozoites are not released during the normal length of time that the organisms pass through the intestine."

A. A.

AZIM (M. A.) & CAIRO (S.). **The Oöcysts of a Coccidium in the Faeces of Laboratory and Wild Rats.**—*Proc. Roy. Soc. Med.* 1927. Mar. Vol. 20. No. 5. pp. 701–704 (Sect. Trop. Dis. & Parasit. pp. 19–22). With 6 text figs. [21 refs.]

The authors describe and figure Coccidium oocysts, either ovoid or broadly elliptical, found by them in faeces of white rats and afterwards in some London dock rats—most often in young rats. Neither vegetative forms nor naked-eye lesions were detected in the intestine of several rats killed and examined. At room temperature the oocysts ripened in 6 or 7 days, then revealing 4 oval sporocysts (each containing 2 sporozoites) and absence of residual protoplasm. The sporocysts are 8·5 μ to 1·5 μ in the major and 6 μ to 6·8 μ in the minor diameter ; the sporozoites are blunt at one end and taper to a point. The important question whether the oocysts be specific to the rat or derived (as THOMSON and ROBERTSON have shown to be the case in some of the species of oocysts found in faeces of Man) from its animal food is fully discussed ; " so far all attempts to demonstrate a development in the intestinal epithelium of the rats have failed " ; but the authors have demonstrated that oocysts of the rabbit coccidium can pass unaltered through the alimentary canal of the rat. Prior observations of Coccidium oocysts found in rats are considered (with references to original papers).

A. A.

YAKIMOFF (W. L.), GALOUZO (J. G.), RASTÉGAÏFF (E. F.) & LOUKIANOFF (W. A.). A propos de la coccidiose des porcs en Russie. [**Coccidiosis of Pigs in Russia.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 215–218. [1 ref.]

Draws attention to the prevalence of coccidiosis in pigs brought to the Petrograd abattoirs from the Crimea. Two kinds of oocysts have been observed.

A. A.

HARTMAN (Ernest). **Certain Interrelations between** *Plasmodium praecox* **and its Host.**—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 407–432. With 8 figs. [12 refs.] [Sch. of Hyg. & Pub. Health, Johns Hopkins Univ.]

This paper deals with certain biometric studies on *Plasmodium praecox* in the canary. The following are its conclusions :—

" 1. During the rise of the infection in the canary the asexual parasites continue to die throughout the cycle. This mortality rate is during 21 hours a mathematical constant, as determined by the fit of the data to an exponential curve.

" 2. Some birds show significant differences in mortality rates of the parasites, and it is suggested that each succeeding asexual generation may have a different mortality rate.

" 3. The findings of Taliaferro (1925) on a constant rate of increase in numbers of parasites from day to day until near the peak of the infection, are confirmed. However, considerable variation in rates occurs in different birds.

" 4. Some cases (probably those not complicated by a drop in red cell count) show a constant rate of decrease of the infection.

" 5. From these data it appears likely that the numbers of malarial parasites present at corresponding times in succeeding asexual cycles describe an autocatalytic population curve.

" 6. Relapse shows the same characteristics of constant rates of increase, and of decrease, without treatment as are exhibited by primary attacks. Relapse may be either more severe or more mild than the initial attack. Thus primary attack and relapse are identical in type of infection, although relapse in bird malaria is usually more mild.

" 7. Symptoms in the bird follow sporulation and peak in numbers and seem to be the direct result of some activity of the parasite or of its decomposition.

" 8. When the parasites are numerous, their size at a given time of day is smaller than either before or after that time when their numbers are fewer. But, whether reduction in size regularly occurs when a certain degree of infection is reached is not known.

" 9. Growth of asexual parasites proceeds at a constant rate from the earliest time measurements have been secured on the population varying in age, to about the time when sporulation begins. It is possible that this growth period may fit that part of an autocatalytic growth curve which can be approximately fitted with an exponential curve.

" 10. The data secured are discussed in reference to the similarity between the relations of host and parasite and the relations of free-living animals and their environments. It is suggested that the host-parasite relationship is on a chemico-physical basis, and that both host and parasite react in the same way in which they would if the stimuli came from a non-living source."

A. A.

HASSELMANN (Gustavo). Alterações patologicas do myocardio na Sarcosporideose. [**Pathological Changes set up in the Myocardium by Sarcosporidia.**]—*Bol. Inst. Brasileiro de Sci.* Rio de Janeiro. 1926. Sept. 14. Vol. 2. No. 9. pp. 310–326. With 12 text figs.

The author first found Sarcosporidial cysts in the heart of an ox in 1915, and during the ensuing eleven years he examined hearts of another 300 animals from the different States of Brazil and found them in every one. The animals were all in good condition and passed as fit for food. The parasite was found only in the heart-muscle. (He believes it to be a new species, and calls it *Miescheria cruzi*). Its effect on the muscle-fibres is to cause atrophy and rupture. The affected fibres stain poorly and lose

their striation, and show a round-celled infiltration with lymphocytes, large mononuclears and some fibroblasts. The interstitial tissue and the vessels reveal similar infiltration. (Similar changes are also present in trichiniasis and in Chagas's disease.) The effects are due, not only to pressure, but in part also to the action of the well-known toxin—sarcocystin. No clinical heart signs were observed, even though at autopsy the cysts were discovered actually involving some of the fibres of the bundle of His.

H. Harold Scott.

BATTISTINI (T.) & WEISS (P.). Contribución al estudio de la *Bartonella muris.* [*Bartonella muris.*]—*An. Facul. de Med.* Lima. 1926. Vol. 9. Nos. 1, 2 & 3. pp. 71–80. With 3 figs. on 1 plate.

In blood of some rats in Lima the authors found intracorpuscular Bartonella bodies. If splenectomy were performed an intense anaemia ensued, the red cells were reduced from 7 million or less, with leucocytosis in the neighbourhood of 50,000 and some erythrophagy by large mononuclears.

Whereas *Bartonella bacilliformis* of Oroya fever varies in shape and size, this *B. muris*, of which there may be from 8 to 19 in a single cell, is rod-shaped and practically of one size.

The authors obtained the " bodies " in pure culture by the process they employed for *B. bacilliformis* in 1920, but failed in transmission experiments to other laboratory animals.

H. Harold Scott.

DE FARIA (Gomes) & CRUZ (Oswaldo). Sur les localisations viscérales de *Bartonella muris* (Carini). [*B. muris* **in the Viscera.**]—*C. R. Soc. Biol.* 1927. Feb. 25. Vol. 96. No. 7. pp. 489–491. With 3 text figs.

In studying the pernicious anaemia of rats that have suffered splenectomy the authors have encountered rats infected with *Bartonella muris*, and they are inclined to agree with LAUDA and MAYER that this may be the organism which, becoming active in certain circumstances (e.g., after removal of the spleen, or in intoxication with " Bayer 205 "), is at the bottom of this pernicious anaemia of rats. They have found the Bartonella in the hepatic capillaries, in the cells of Kupfer, and in the liver cells (where sometimes they resemble Rickettsia clumps), also in the capillaries of the lungs both free and engulfed in macrophages. For studying the organism they recommend the iron-haematoxylin stain.

A. A.

NAUCK (E. G.). Ueber Befunde im Blut splenektomierter Nager. [**Observations on the Blood of Splenectomized Rodents.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. July. Vol. 31. No. 7. pp. 322–329. With 7 text figs. [Peking Union Med. Coll.]

The author describes and figures Grahamella and also certain extracellular coccoid and bacillar bodies found in the blood of anaemic splenectomized rodents. He does not consider his observations ripe enough to justify any final conclusions as to their significance in connexion with anaemia, though they are consistent with the view that rodents may normally harbour infections that remain latent as long as the spleen is intact.

A. A.

SCHWETZ (J.). Contribution à l'étude des moustiques d'Elisabethville et de quelques autres localités du Katanga (Congo belge). [**The Mosquitoes of Elizabethville.**]—*Bull. Soc. Path. Exot.* 1927. Feb. 9. Vol. 20. No. 2. pp. 170–192. With 1 map in text. [3 refs.]

In the course of a survey of Katanga for other purposes the author had an opportunity of making a careful study of the mosquitoes of Elizabethville and also took some notice of the mosquitoes of other parts of the country. In Elizabethville, where breeding-places (both natural and otherwise) are "not wanting," he identified, by capture of adults and breeding of larvae, 34 species including 11 Anopheles. During the dry season (May–November) mosquitoes are seldom to be seen in houses, those that are occasionally found being *Culex fatigans*, *Anopheles costalis* and *A. funestus* and larvae of Anopheles are very hard to find anywhere. During the wet season (November-April) Anopheles larvae are plentiful, and *Culex fatigans*, *Anopheles costalis* and *A. funestus* are to be found in all the houses; *Aëdes argenteus* (*Stegomyia fasciata*) is not so common as in many other parts of the Congo, however. In addition to the two already named, the following species of Anopheles were observed by the author: *implexus*, *maculipalpis*, *mauritianus*, *squamosus*, *pitchfordii*, *transvalensis*, *wellcomei*, *pharoensis*, and *theileri* at Elizabethville and its environs, and away from Elizabethville *distinctus* and *kingi* in addition. The author gives lists, with precise localities and particulars as to abundance, of all the species of Culicidae observed by him at Elizabethville and in other places in Katanga.

A. A.

FREEBORN (Stanley B.). **The Mosquitoes of California.** - *Univ. California Public. Entom.* 1926. Mar. 24. Vol. 3. No. 5. pp. 333–460. With 41 text figs. [31 refs.]

The mosquitoes of California are represented by 32 species and are included in 5 genera. In this full and lucid taxonomic survey are to be found not only succinct and diversified keys and full and clear individual definitions of the genera and species, but also much strictly relevant information regarding the habits, breeding, range, and characteristic peculiarities of individual species; furthermore, there is an abundance of large clear text-figures, all very much to the point. In the general preliminaries the author defines the Mosquito family as excluding the Chaoborines (Corethrines) and as compact of two subfamilies—Culicinae and Anophelinae, the Sabethes group being included with the Culicines.

A. A.

MACKERRAS (I. M.). [**The Mosquitoes of the Sydney District.**]—*Aust. Nat.* 1926. Oct. Vol. 6. Pt. 3. pp. 33–42. [Summarized in *Rev. Applied Entom.* 1927. Apr. Vol. 15. Ser. B. Pt. 4. p. 60.]

Among the 28 species of mosquitoes of the Sydney district are *Anopheles annulipes*, *atratipes*, and *stigmaticus*, but not *Aëdes argenteus* (*Stegomyia fasciata*). It is said that only two cases of malaria are definitely known to have occurred. The author therefore thinks that the expense and inconvenience of antilarval measures are hardly justifiable in the district.

A. A.

LESTER (A. R.). **The Coconut Palm. Its Potentialities in providing Breeding Places for Mosquitoes.**—*Jl. Trop. Med. & Hyg.* 1927. June 1. Vol. 30. No. 11. pp. 137–145. With 9 figs. on 1 plate. [5 refs.]

The copious details of this very careful investigation cannot be contracted, but its summarized conclusions are given in full. It must be added that in the course of his investigations the author employed two native climbers who had been trained by and had worked with the man who produced water and mosquito larvae from coconut palms for Dr. HAWORTH, and that these men could not now produce them from this source. The pertinent information is added that the expert employed by Dr. HAWORTH could not be secured, and that it was alleged that he had recently served a term of imprisonment for theft.

"To summarize, it was found that with a negligible proportion of exceptions, no water lodges in the open hollows of basal leaves in natural conditions for longer than an hour. In the few cases where water was retained for over twenty-four hours artificial conditions were maintained. In the artificial and more or less ideal conditions in which experiments on cut leaves were made, water stood for under 60 hours. It is considered unlikely that such ideal conditions occur frequently in nature. Fluid is undoubtedly retained in the crown of the palm, but has hitherto been noticed only at the bases of mesial leaves. Many mesial leaves present dampness. The amount of fluid collected from these sources has varied between a few drops and 56 cc. from a single leaf. The fluid is found more frequently and in larger amounts shortly after rain. The fluid can be retained for at least 21 days. It is conceivable that this period could be lengthened, bearing in mind the fact that it is contained in an enclosed space, from which it has displaced air, and evaporation is consequently retarded. The quantity absorbed by the living plant remains open to investigation. The swaying of leaves in a breeze of ordinary velocity is naturally most marked at their distal ends, and does not break the contiguity of stem and mid-rib of mesial leaves. That the fluid retained is water—rain or dew or both—is considered probable. The minute remains of organic matter detected are probably derived from the fibrous bracts in course of percolation, and from the raw surface of the perforation through which the water flows in collection. A very much fainter trace of organic matter was detected when two borers, fitting one another closely, were employed. A mallet was required to secure a perforation when using two and, on removal of the inner tube, water flowed through the outer. The amount and frequency with which water is struck in mesial leaves appears to bear a close relation to the rainfall. The theory that this fluid is a secretion or excretion of the tree is discounted by its composition and the simple physical explanation of its presence. It is difficult to comprehend—though this does not rule out the theory—the purpose of a function relegated to the basal portion of three or four leaves mesially situated, and it is not too much to assume that the fluid would be found with greater constancy in all mesial leaves affording space at their bases if it were an excretion or secretion, or that the amount yielded would bear a more or less constant ratio to the space available and the yield of other leaves on the same plant. Again, the loss of such function when the mesial leaf becomes in turn a basal one requires explanation. The water present in certain leaves is in an enclosed space inaccessible to mosquitoes. Dense opaque white webs frequently guard the approach to such axils and careful scrutiny has failed to reveal a single mosquito entangled in the mesh above or from below. It is to be remarked incidentally that rain water has frequently been found in the axils of leaves corresponding with basal ones in the coco-nut palm, of the pineapple, sisal and allied plants, the travellers' or fan-palm, and the banana-palm. We have not yet found mosquito larvae in any of these. The absence of the necessary pabulum in what amounts

to distilled water is a possible reason. There is no apparent structural difference in the leaves or their mode of attachment in a low or tall coco-nut palm. Ollweg infers that anopheles breed in the axils of coco-palms and that it would become important if other breeding places were dealt with. Pomeroy failed to find anopheline larvae, but omits to state whether any other mosquito larvae were discovered. At no time in our investigations, in all conditions of weather, location or altitude, have mosquito larvae been found in the axils or hollows of coconut-palm leaves, though found breeding at all seasons of the year in pools, aqueducts, coconut shells and many other places in close proximity. Natural enemies of the mosquito in its larval stage abound in coconut-palms.

"We feel unable, though, without the assistance of Dr. Haworth's skilled climber, to corroborate his results. If water were present in proportions approaching this observer's figures, in what are understood from his description to refer to basal leaves, it seems hardly possible that it could have escaped observation. The experiments of pouring in water seem to show that only under exceptional circumstances such as long-continued rain or abnormalities of form or attachment in certain leaves, high humidity and still atmosphere, can water be retained for much over 24 hours.

"It is found difficult to reconcile the results attained, and it is felt that, in spite of the careful precautions taken to prevent inaccuracies, the possibility of Haworth's tree climber having been able to ensure his success by artificial means cannot yet be excluded.

"The natural conclusion arrived at from a résumé of our observations is that in present conditions the presence of coconut-palms as presenting a source of breeding for mosquitos does not appear prejudicial to the health of a community living in the vicinity, and that before any drastic measures are taken to deal with such palms, in view of their economic importance, further observations could usefully be undertaken."

A. A.

CLEARE, Jr. (L. D.). **Notes on the Breeding-Habits of Two Mosquitos.** — *Bull. Entom. Res.* 1927. June. Vol. 17. Pt. 4. pp. 405–409. With 1 text fig., 1 plate & 1 sketch plan.

Silting due to outworks against the sea, in the neighbourhood of Georgetown in British Guiana, has naturally been followed by the formation of brackish swamps and shallow pools along the foreshore, the salinity of these pools varying periodically with the occasional encroachment of spring-tides, and seasonally with rainy weather, from 3·8 to 15·3 gm. of salt per litre. Although the higher extremes of salinity are far greater than that which the larvae of *Anopheles tarsimaculatus* have been said to be capable of enduring, larvae of that species have been found in considerable numbers in these pools in a salinity of 11·2 gm. per litre. Numerous natural enemies (including fishes) also flourish in these weedy pools. With the breaking-up of the dry season *Aëdes taeniorhynchus* is also to be found, in swarms, in the same locality.

A. A.

HAMLYN-HARRIS (R.). **Notes on the Breeding-Places of Two Mosquitos in Queensland.**—*Bull. Entom. Res.* 1927. June. Vol. 17. Pt. 4. pp. 411–414. [9 refs.]

Although in townships in Queensland *Aëdes argenteus* breeds in almost any sort of vessel that holds fresh water, its chief breeding-place is the rainwater tank; receptacles containing liquid manure in an exhausted

state also are attractive. From the sanitarian standpoint it is suggestive that its larvae may sometimes be found (along with *Aëdes notoscriptus* and *Culex fatigans*) in water-storage made of brick or cement.

Anopheles annulipes breeds in waters of many kinds, both natural and artificial—pools, streams, swamps, trickles, water-holes, hoof-prints, etc.; borrow-pits, troughs, water-barrels; also in salt or brackish water, and sometimes in foul water (along with *Culex fatigans*). Its larvae can be found at any time of year, though during the coldest days of winter they have a tendency to hide until the day gets warm. The author notes that the larvae of this species have been found in great abundance in a shallow brook in which the Characeous Nitella was growing.

A. A.

Bianchi Lischetti (Angel). Experiencias sobre la acción de substancias tóxicas sobre mosquitos adultos. [**Action of Poisons on Adult Mosquitoes.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 466–480.

The avidity of adult mosquitoes of both sexes for honey has led the author to try poisoned honey as a destructive bait. The poisons used in experiment were mercury chloride, boric acid, various arsenic salts, and cyanide of potash. The last was the most potent, but its power soon evaporated. The best was arsenite of potash. The honey, though poisoned, did not lose its attraction for the mosquitoes; the females sucked the honey without waiting for an opportunity to suck blood, even when it was placed as an impediment to an attractive animal, and they did not survive long enough to deposit their eggs. [The riskiness of poisoned honey is not considered].

A. A.

Roy (D. N.). **The Physiology and Function of the Oesophageal Diverticula and of the Salivary Glands in Mosquitoes.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 995–1004. With 1 text fig. [9 refs.]

After discussing the observations and conclusions of earlier workers and describing his own technique, the author gives an account of his present experiments. He finds that blood can easily be detected in all three diverticula when the stomach is full, as it will be when a mosquito has continued sucking from $1\frac{1}{2}$ to $2\frac{1}{2}$ minutes. The blood corpuscles suffer no change in the diverticula; therefore these are to be regarded as simple reservoirs. An emulsion of the diverticula (both of male and female) rubbed into a needle-puncture causes a wheal having the circumference of a pea, with surrounding erythema that may be an inch in circumference, the effect being severer than that of an emulsion of the salivary glands. No evidence of an anti-coagulant effect can be found in the secretions either of the diverticula or of the salivary glands.

A. A.

de Buck (A.), Schoute (E.) & Swellengrebel (N. H.). Recherches sur l'anophélisme sans paludisme aux environs d'Amsterdam. (**Researches on Anophelism without Malaria in the Territory surrounding Amsterdam.**)—*Riv. di Malariologia.* 1927. Jan.–Feb. Vol. 6. No. 1. pp. 8–39. With 1 map in text. [11 refs.] [English summary pp. 190–191.]

SWELLENGREBEL (N. H.), DE BUCK (A.) & SCHOUTE (E.). **On Anophelism without Malaria around Amsterdam.**—*Koninklijke Akademie van Wetenschappen te Amsterdam. Proceedings.* Vol. 30. No. 1. pp. 61–68. With 1 map in text. [Refs. in footnotes.]

DE BUCK (A.), SWELLENGREBEL (N. H.) & SCHOUTE (E.). **Studies on Anophelism without Malaria in the Vicinity of Amsterdam.**—*Bull. Entom. Res.* 1927. June. Vol. 17. Pt. 4. pp. 351–371. With 1 sketch map. [11 refs.] [Inst. Trop. Hyg., Amsterdam.]

Comparing two areas around Amsterdam only one of which is endemically malarious although *Anopheles maculipennis* is numerous in both, the authors have very thoroughly investigated the *maculipennis* population of the two areas in order to ascertain whether it exhibits any biological differences sufficient to explain the difference between them in respect of malaria.

To begin with, they looked for structural differences between the two insect populations, not for the primary importance, but for the practical convenience of such differences, and they confirmed VAN THIEL's discovery of the existence of two races of *maculipennis* (female) in Holland—a larger race and a smaller race [this *Bulletin*, Vol. 23, p. 712 and below, p. 883]. They discovered also that in the first summer brood of each the female of the smaller race attains the same size as the female of the larger race, while the latter also is abnormally large; and this discovery led them, through much interesting detail, to the conclusion that, notwithstanding this seasonal phenomenon, the difference in size between the two races is a fixed difference determined by heredity.

The points of practical importance are that the larger race predominates in the non-malarious area, and the smaller race in the malarious area; and that although both races have been found equally susceptible to infection (with *P. vivax*), each race has instincts of its own—differences of habit that are reflected in its efficiency as an agent in the upkeep of malaria. The larger race, predominant in the non-malarious area, according to the authors' observation, is disinclined for human blood in June—a month when the annual malaria epidemic is at a climax in Holland; it also has a disinclination for blood of any kind in September and October, and later on passes into a state of "complete" hibernation: all these peculiarities tell against it. The smaller race, on the other hand, is more constantly voracious, feeding on man freely in June, August, and September, and more than ever in October: again, instead of becoming torpid it passes the winter in a state of "semi-hibernation"; these peculiarities render it likely to become infected, and also to keep up an infection through winter.

The authors admit that their investigations require confirmation, even for Holland; nor do they claim that their explanation is of universal application; but their argument is interesting and in its detail very instructive, so that the paper should be read *in extenso*.

A. A.

DOORENBOS (W. B.). Zijn de muskieten, die malaria onderhouden, abnormaal levende exemplaren? [**Are the Mosquitoes transmitting Malaria Individuals living under Abnormal Conditions?**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 21–27.

In some Sumatran rubber plantations the author found *A. kochii* and *A. leucosphyrus* to be malaria infected; *A. kochii* both in the coolie-

lines (5 out of 214 ; 2·3 per cent.) and in dry ditches in proximity to the lines (10 out of 584 or 1·7 per cent.) ; *A. leucosphyrus* (which was hardly ever caught in human habitations) only in the ditches (4 out of 101). The domestic *A. hyrcanus* (*sinensis*), of which 696 were caught in houses and 122 in the ditches, was not found infected. On these findings the author criticizes JAMES' views regarding *A. maculipennis*, that only individuals leading an abnormal indoor life transmit malaria. His opinion is that this appears to be true for *A. maculipennis* only because that species as a whole is markedly domestic.

N. H. Swellengrebel.

COVELL (G.). **The Distribution of Anopheline Mosquitoes in India and Ceylon.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1927. Feb. Memoir No. 5. pp. 1–85. With 36 maps. [Numerous refs.]

This Distribution of Anopheles Mosquitoes in India and Ceylon is a princely work. Its most sumptuous feature is a uniform series of maps of India and Ceylon, of good and convenient size, and blank except for provincial boundary lines, each one of which exhibits in colour the geographical distribution of a particular species of Anopheles. The text that the maps illustrate gives for each species the critically-confirmed record of the places where that species has been observed. This less showy part of the work must have demanded an infinite amount of toil—labour of the kind that brings its physic only to the man of inflexible resolve. Apart from the maps (some of which are greatly instructive to students of zoo-geography in general) and apart from the well-constructed record, each species is introduced by statements of its synonymy, of its general geographical distribution (where required), and of its relation to malaria (where known), and by a brief description of the habitat of its larva.

A. A.

CHRISTOPHERS (S. R.), SINTON (J. A.) & COVELL (G.). **Synoptic Table for the Identification of the Anopheline Mosquitoes of India.**—*Health Bull. No. 10. Malaria Bureau No. 2.* 22 pp. With 37 figs. 1927. Calcutta : Govt. of India, Central Publication Branch.

This useful key is well lubricated with explanatory notes, definitions of topical terms, and figures of specific features.

A. A.

BOYD (Mark F.). **Studies on the Bionomics of North American Anophelines. 1. The Number of Annual Broods of** *A. quadri maculatus.*—*Amer. Jl. Hyg.* 1927. May. Vol. 7. No. 3. pp. 264–275. With 4 charts. [2 refs.]

This paper must be read *in extenso*, since its conclusions rest so much on ratiocination that cannot be condensed. From a comparative study of the charted results of routine observations at " capture-stations " carried on for a succession of years (1923–1926) the author assumes that

certain sudden irregularities in the curves afford a clue to the number of generations of *Anopheles quadrimaculatus* occurring each year. His results give 8 to 10 annual generations in the latitude of south-western Georgia and 7 or 8 in that of north-eastern Carolina.

A. A.

SWELLENGREBEL (N. H.). La signification du nombre relatif des mâles dans les abris des anophèles adultes. [**Significance of the Relative Number of Males of Anopheles in Shelters.**]—*Bull. Soc. Path. Exot.* 1927. Feb. 9. Vol. 20. No. 2. pp. 121–123. [2 refs.]

Several ingenious explanations have been offered of the fact that the proportion of males to females of Anopheles found in shelters varies considerably. According to one theory the paucity of males in a shelter indicates distance from a breeding-place; according to another the males are most numerous in shelters that also provide easily procurable nourishment (of blood) for the females. From his observations around Amsterdam the author, finding breeding-places everywhere close at hand and the greatest abundance of males in shelters where (as proved by numbers of females replete with blood) blood is easily procurable, and fewer males in shelters such as barns and corn-lofts, where females are fewer and nourishment for females is less easily obtained, comes to the plain conclusion that the former kind of shelters must just be good sheltering-places for Anopheles mosquitoes. In short, the finding of a large proportion of male Anopheles in a given shelter signifies that the shelter is attractive to the Anopheles regardless of their sexual propensities.

A. A.

CHALAM (B. S.). **The Resistance of Anopheles Eggs to Desiccation.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 863–866.

Eggs of *Anopheles subpictus* and *A. stephensi* were observed by the author to hatch normally in considerable numbers—and in some cases with continuation through the normal metamorphoses to the adult stage—when returned to water after considerable terms of desiccation. For instance; of 100 eggs of *A. subpictus* 60 hatched after 6 days desiccation, and of another 100 eggs 2 hatched after 12 days desiccation. Again, of 80 eggs of *A. stephensi* 51 hatched after 6 days, and of another 100 eggs 3 hatched after 12 days desiccation. In all these instances some adults were forthcoming. The author gives details of 10 other experiments; but in no instance did any eggs hatch that had been dried for a longer term than 12 days.

A. A.

BARBER (M. A.). **The Food of Anopheline Larvae—Food Organisms in Pure Culture.**—*Public Health Rep.* 1927. June 3. Vol. 42. No. 22. pp. 1494–1510. With 1 text fig. [10 refs.]

An instructive and suggestive paper for the inexperienced. The author's summarized results are stated in the propositions that algae alone, or bacteria alone, or infusoria alone may be a sufficient source of

food for Anopheles larvae ; but that, in the laboratory at least, dead organic material is far less suitable ; also that measures for suppression of larvae by destruction of their available food must take into consideration the adaptability of larvae to a variety of food.

A. A.

ADOVA, NIKITINSKY & SEBENZOW. Biologie et constitution physico-chimique des tourbières et conditions qui y règlent le stationnement des larves d'anophèles. [**Biology and Character of Bogs in respect to the Presence of Anopheles Larvae.**]—*Bull. Soc. Path. Exot.* 1927. Feb. 9 & Mar. 9. Vol. 20. Nos. 2 & 3. pp. 192–196 ; 271–279. [4 refs.]

The authors admit that the term of their observations has been short, but they think that it has been long enough to justify the generalization that the bogs examined by them (in Russia) are of two kinds, namely Carex bogs, the water of which is rich and varied in life and is hospitable to Anopheles larvae ; and Sphagnum bogs in which Anopheles larvae are not to be found.

A. A.

VAN THIEL (P. H.). Sur l'origine des variations de taille de l'*Anopheles maculipennis* dans les Pays-Bas. [**Origin of Variations in Size of** *A. maculipennis* **in the Netherlands.**] — *Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 366–390. [13 refs.]

The author here returns to the subject of variation in *Anopheles maculipennis* (females) in Holland (see this *Bulletin*, Vol. 23, p. 712). He here distinguishes two varieties. One, which is larger and browner, and, having fewer maxillary teeth, is less ferocious, he assumes to be the typical *A. maculipenins* of Meigen ; the other which is smaller and blacker and (in correspondence with its more numerous maxillary teeth) is more ferocious, he now distinguishes as a new variety *atroparvus*. The larger, less ferocious kind predominates in non-malarious districts like Leiden ; the smaller, more ferocious kind predominates in malarious districts like Bolsward. As to the origin of this more dangerous variety he naturally is cautious, but he thinks the line of inquiry is indicated by the fact that its larva prefers brackish waters, and by the reasonable inference that its nutrition may have been influenced in the course of generations by this mode of life.

A. A.

STRICKLAND (C.) & CHOWDHURY (K. L.). **A New Species of Anopheline** *A. pseudojamesi* **Common in Bengal.**—*Indian Med. Gaz.* 1927. May. Vol. 62. No. 5. pp. 240–243. With 5 text figs. [3 refs.]

Diagnoses, illustrated, of larva and adult of *Anopheles pseudojamesi*, a species which, although said to be found " all over Bengal," seems not to have been noticed before. The larva, which first attracted attention, was thought from descriptions of that species to be *pulcherrimus* ; but the first adult that issued was identified with *jamesi* though afterwards it was found to have distinctive characters of its own.

A. A.

COVELL (G.). **A New Species of Anopheles from Eastern India,** *A.* (*Myzomyia*) *Ramsayi*; **with a New Description of** *A.* (*Myzomyia*) *Jamesii* **Theobald.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 1019–1025. With 2 figs. on 1 plate. [3 refs.]

Diagnoses and descriptions with figures of wing of *Anopheles* (*Myzomyia*) *ramsayi*, a new species from Cachar and Krishnagar, and *A.* (*M.*) *jamesii* of Theobald.

A. A.

MELENEY (Henry E.). **The Types of Breeding Place used by** *Anopheles hyrcanus* **in North and Central China.**—*China Med. Jl.* 1927. Apr. Vol. 41. No. 4. pp. 347–350. [2 refs.]

According to the author *Anopheles hyrcanus* (=*sinensis*) is the chief malaria-carrier in Northern and Central China. Though occasionally its larvae are found in waters of other kinds, its usual breeding-places are ponds where the silk-weed Spirogyra forms a surface scum and the common water-weed Ceratophyllum, which grows up from the bottom, spreads its whorls just below the surface. "At Nanking, where many of the ponds are used for fish-raising, larvae were never found in ponds so used, and such ponds never contained any surface water-plants."

For controlling *A. hyrcanus*, if draining and filling ponds be impossible, the author recommends Paris green as a larvicide and, if this be impossible, cleaning out the surface plants and stocking fish.

A. A.

ROOT (Francis Metcalf). **Studies on Brazilian Mosquitoes. II.** *Chagasia fajardoi.*—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 470–480. With 21 figs. on 4 plates. [13 refs.]

This is a study in full detail of *Chagasia fajardoi*, adult, larva, and pupa, in itself and in comparison with *C. bonneae*. The author considers that the differences between Chagasia and other Anophelines are striking enough to justify its separation as a distinct Anopheline genus; these differences are exhibited in the shape of the scutellum, which is distinctly trilobed with a tuft of bristles on each lobe, as in Culicini; and in the genitalia, claws, and palpi of the male, these palpi having the two terminal segments merely "somewhat swollen," not broadly flattened. The larvae and pupae of *Chagasia fajardoi* appear to be found only in streams where the current runs rapidly in narrow channels thickly fringed with tall grasses or sedges; the larvae in the laboratory are peculiar in posing close and *parallel* to the sides of the dish with the body slightly elevated at both ends, their whole behaviour being "very faintly reminiscent" of the Dixa larva.

A. A.

SEPULCRI (Piero). La valle Brian. Contributo allo studio igienico dell' ambiente palustre litoraneo. (**The Brian Valley. Contribution to Knowledge of the Marshy Littoral Environment.**)—*Riv. di Malariologia.* 1927. Jan.–Feb. Vol. 6. No. 1. pp. 72–84. With 6 text figs. (1 map.) [English summary p. 191.]

The valley of Brian, enclosed between the two mouths of the Livenza R. (Venetia), is a prolific nursery of Anopheles, although its stagnant waters are saline. This is said to be due to the fact that the fishing industry is unmindful both of the interests of agriculture and of the necessities of sanitation.

A. A.

MISSIROLI (Alberto). I tubuli del Malphigi nell' "Anopheles claviger." (**The Malphighian Tubes of the "Anopheles claviger."**)—*Riv. di Malariologia.* 1927. Jan.–Feb. Vol. 6. No. 1. pp. 1–7. With 2 text figs. & 1 plate. [4 refs.] [English summary p. 190.]

This paper deals with the histology and physiology of the Malpighian tubules of *Anopheles "claviger"* (=*maculipennis*), which the author believes to play some part in assimilation in addition to their excretory function.

A. A.

PATANÉ (Carlo). Sulla distribuzione di "*Stegomyia fasciata*" in Cirenaica. Sua frequenza ed abitudini biologiche in Bengasi nella diverse stagioni. [**The Seasonal Prevalence and Habits of** *Stegomyia fasciata* **in Bengasi.**]—*Arch. Ital. Sci. Med. Colon.* 1927. May. Vol. 8. No. 5. pp. 262–270. With 1 map. [6 refs.]

Stegomyia (*Aëdes argenteus*) is present in Cirenaica all the year round. It is troublesome about June, biting at any hour and even in the night. From June to September it constitutes 20 to 25 per cent. of all local mosquitoes; after the middle of November its numbers diminish, and in winter it is scarce, seen only indoors, and biting only at midday.

H. Harold Scott.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Action des diastases dans le déterminisme d'éclosion de l'oeuf chez le moustique de la fièvre jaune (*Stegomyia fasciata*). [**Action of Diastase on the Hatching of the Egg of** *S. fasciata.*]—*C.R. Acad. Sci.* 1927. Jan. 24. Vol. 184. No. 4. pp. 248–249. [2 refs.]

BACOT and ATKIN observed the stimulant effect of microbes and ferments upon the hatching of the eggs of *Stegomyia fasciata*; the present authors have observed the same effect exercised by animal and vegetable digestive ferments.

A. A.

HAKKI (Ismaïl). Sur les moustiques d'Anatolie (Turquie). [**The Mosquitoes of Anatolia.**]—*Rev. Méd. et Hyg. Trop.* 1927. Jan.–Feb. Vol. 19. No. 1. p. 8.

Most of the mosquitoes of Anatolia (Asia Minor) mentioned here are common Palaearctic species with—as one would expect—some Ethiopian outliers, such as *Anopheles costalis*, and with the ubiquitous *Stegomyia fasciata*.

KANDELAKI (Simon). Zur Fauna der Stechmücken in Transkaukasien. [**Mosquito Fauna in Transcaucasus.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. June. Vol. 31. No. 6. pp. 291–297. [30 refs.]

A list, with brief commentary and specific localization, of the local mosquitoes and species of Phlebotomus.

ROOT (Francis Metcalf). **Note on the Mosquito Fauna of the Republic of Haiti.**—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 463–469. With 4 figs. [2 refs.] [Sch. of Hyg. & Pub. Health, Johns Hopkins Univ.]

This list of mosquitoes from Haiti comprises 31 species and includes *Culex quinquefasciatus*, *Aëdes aegypti*, and two species of Anopheles, namely, *albimanus* and *grabhami*.

A. A.

SINTON (J. A.). **Notes on Some Indian Species of the Genus** *Phlebotomus.* **Part XVI. Two Assamese 'Sandflies' resembling** *P. malabaricus.* **Part XVII. Further Records of the Geographical Distribution. Part XVIII. Miscellaneous Notes.**—*Indian Jl. Med. Res.* 1927. April. Vol. 14. No. 4. pp. 933–939. With 10 figs. on 1 plate. [9 refs.]; pp. 941–945. [8 refs.]; pp. 947–953. With 11 figs. on 1 plate. [25 refs.]

In the first of these papers, two specimens of Phlebotomus are described from Assam which the author regards as being approximate to *P. malabaricus* and *P. zeylanicus*, if indeed they are not actually identical with the former of these species.

[The numerous and striking zoological affinities between the Eastern Himalayan (and Malayan) subregion of the Oriental Region on the one hand, and the Malabar-Ceylon subregion on the other hand—affinities that have been discussed and confirmed by several zoologists since they were first remarked by A. R. WALLACE—here find another very interesting illustration. See this *Bulletin*, Vol. 22, p. 287.].

The second paper contains records of the distribution of the several species of Phlebotomus in India and the border territories.

The third paper includes notes on *P. squamipleuris*; a record of dermal leishmaniasis in Chitral; new records of the existence of *P. argentipes* both from known foci of kala-azar and from places where that disease is not endemic; and a note on certain papillae observed on various parts of the body of Phlebotomus.

A. A.

SINTON (J. A.). **Notes on Some Indian Species of the Genus** *Phlebotomus.* **Part XIX. The Value of the Female Genitalia in the Identification of Species. Part XX. The Morphology of the Buccal Cavity in Some Species. Part XXI.** *Phlebotomus christophersi* **n. sp.**—*Indian Jl. Med. Res.* 1927. July. Vol. 15. No. 1. pp. 21–27. With 39 figs. on 2 plates. [8 refs.]; pp. 29–32. With 13 figs. on 1 plate. [4 refs.]; pp. 33–40. With 12 figs. on 1 plate. [3 refs.]

xix. A comparative study of some Indian species of Phlebotomus shows the existence of two types of spermatheca, one crenellated, the other smooth. Species having this organ crenellated are *argentipes, christophersi, major, papatasii,* and *simillimus* (var. *hospitii*) and all these can be differentiated by subordinate differences (here figured) in the shape of the organ, these differences being particularly striking in the case of *argentipes, major,* and *papatasii*; but this is not very clearly the case with the smooth spermatheca species. The two types of spermatheca correspond very closely with NEWSTEAD's division of the genus into erect-haired and recumbent-haired groups.

xx. Structural detail (here described and figured) of the buccal cavity of a large number of several Indian species of Phlebotomus show specific constancy, and is concluded to be of much diagnostic value, especially in the recumbent-haired group.

xxi. Diagnosis, full description and figured detail of *P. christophersi,* a new species from Lahore.

A. A.

ASHNER (M.). **Observations on the Breeding of** *Phlebotomus papatasii.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 452–454. With 1 text fig. [3 refs.]

After commenting on methods of breeding *Phlebotomus papatasii* employed by workers in other parts of the world, the author describes his own method which, in Jerusalem, gives results that are said to be quite certain and uniformly constant.

"Twenty to thirty females are brought into an earthenware pot, about 15 cm. in diameter and 5 cm. deep. The pot is covered with a piece of cloth and kept in an incubator at a temperature of 30° to 32° C. The necessary moisture inside the pot is provided by placing it in a dish of water, and the concentration regulated by increasing or decreasing the depth of the water in the dish. In case the pots are too porous we found it more convenient to place them in a dish containing damp soil, the moisture in the pots being regulated by the degree of dampness of the soil. This method saves the trouble of adding water to the pans daily, because the evaporation from the soil is slower. After five to six days most of the females will have laid their eggs and died. The pot is then opened and the number of eggs laid determined. The eggs are found both scattered and in batches on the bottom and the wall of the vessel. As a rule three or four days after opening the pot the first larvae hatch, and now food must be given immediately, because the newly hatched larvae do not live more than a day without food. It is also possible to scatter a few particles of the food mixture into the pot before putting in the females, so that there is enough food present when the larvae appear. After each examination the pot should be covered again with the cloth, to prevent the larvae escaping and other insects from laying their eggs in the food substrate.

"When the pupae start hatching the pots are opened daily in a small muslin cage, where the emerged adults are easily caught into test-tubes. Under normal conditions the hatching of the pupae will be finished in two or three weeks; but, where the conditions are not optimal, one can still find unpupated larvae a month or so after the first adult comes out. As a rule males and females hatch at the same time and in equal numbers; the females thus become fertilized while still in the breeding pot.

"The laboratory-bred females feed much more readily than those caught wild. They may feed two or three times during the first week without difficulty. At a temperature of 25° C., at which our flies are kept, it takes about nine days after the first blood meal for the eggs to develop and then oviposition will take place if the females are placed in the breeding pots. It is thus possible to rear several generations of *P. papatasii* in the laboratory without any difficulty."

A. A.

ADLER (S.) & THEODOR (O.). **On a Collection of Phlebotomus sp. of the Minutus Group.**—*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 61–68. With 11 figs. on 1 plate & 1 text fig. [2 refs.]

The authors have dealt with the following material referable to the *Phlebotomus minutus* group: 191 males and 229 females collected in Palestine, 16 males and 112 females from Algeria, and 8 of each sex from Assam. The characters (of wing, antenna, palp, male genitalia, colour) formulated for distinguishing the separate species of this group being found insufficient, the authors searched for other and accurately distinctive specific characters. Such they think they have found in the form of the spermathecae of the female, and in the shape and armature of the pharynx and of the buccal cavity of either sex. By these

characters they can not only accurately distinguish *P. minutus* from *P. africanus*, but can also separate three new species. One of these new species is represented by a single female from Palestine, another by 18 females and 4 males from Algeria, and the third by all the 16 individuals from Assam. *P. minutus* var. *niger* can be distinguished only by its colour.

[As has been well said, accuracy is the keystone of science ; but, as has been equally well said, accuracy must be followed over a very wide field of general comparative study before the keystone can be regarded as fixed.]

A. A.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Recherches biologiques sur les phlébotomes de la Tunisie du Nord. Méthode d'isolement cellulaire pour l'éducation sélectionnée des espèces. [**Biological Researches on Phlebotomus of N. Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1927. Apr. Vol. 16. No. 1. pp. 59–80. With 2 text figs. [16 refs.]

In northern Tunis 4 species of Phlebotomus—*P. papatasii. P. perniciosus*, *P. sergenti*, and *P. minutus* var. *africanus*—are to be found, the first three always in the vicinity of man and apparently having a preference for human blood, the last not having any such predilections but feeding chiefly on the blood of " small cold-blooded animals." The authors describe in detail their methods of breeding Phlebotomus for experimental purpose—methods not differing in principle from those already described by other successful operators, particularly SMITH (see this *Bulletin*, Vol. 22, p. 905–6). In describing their own observations of the larval development of *P. papatasii* they do not agree with WHITTINGHAM and ROOK that the hibernation of the fourth-stage-larva of its autumnal brood is directly due to cold (a fall of temperature below 65° F.), but regard it as a natural irregularity of growth, not peculiar to the fourth larval stage, which happens in this case to synchronize with a seasonal fall of temperature and increase of humidity [a fine distinction].

The life-cycle of *P. perniciosus* is described in detail. Its eggs, which are very much like those of *papatasii*, were deposited about 12 days after the feed of blood ; in one instance 71 eggs were laid, frequently 45 to 60 were delivered ; at a temperature of 28° C., and suitable humidity, they hatched in 6 or 7 days. The mean duration of larval life, at 28° to 30° C., was 13–19 days, of which 5 to 7 were passed in the fourth stage. The pupa stage, at 28° C., lasted 8 days. Thus the whole cycle from egg to adult might be completed (at 28° C.) in 30 days. Quite apart from the well-known influence of temperature and humidity, the authors observed a certain want of uniformity of development even in the issue of eggs of the same batch raised under the same conditions. Thus, " in a batch of eggs laid on the 18th and hatched on the 30th of September, certain individuals of both sexes completed their development after delays varying from 54 to 70 days, whilst certain tardy larvae did not issue into imagines until 106 to 110, occasionally 140, days." The authors noticed irregularities of behaviour in female adults, also of both of *P. perniciosus* and *P. papatasii* ; some of the former would take two feeds of blood before depositing their eggs, and those of the latter species were frequently observed to feed several times, at intervals of 24 hours, before producing eggs.

A. A.

WEISS (A.). Notes sur les captures de phlébotomes effectuées dans la banlieue nord de Tunis de juillet à fin octobre 1926. [**Captures of Phlebotomus in the Northern Suburbs of Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1927. Apr. Vol. 16. No. 1. pp. 84–89.

In four months (July–October) in the course of periodic visits to particular native houses in the northern suburb of Tunis the author captured 1,697 specimens of Phlebotomus, chiefly *P. perniciosus* and *P. papatasii*.

A. A.

i. PATERSON (Guillermo C.) & SHANNON (Raymond C.). Sobre una nueva especie del género *Phlebotomus* encontrada en las provincias del norte de la República. [**New Species of Phlebotomus from N. Argentine.**] —*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 298–304. With 3 text figs.

ii. ——. Sobre otra nueva especie del género *Phlebotomus* encontrado en la provincia de Jujuy.—*Ibid.* pp. 305–309. With 3 text figs.

i. Description and figures of the male of *Phlebotomus araozi*, a new species from the Jujuy and other districts in the north of the Argentine Republic where dermal leishmaniasis is endemic; its nearest affinity is with *P. migonei* of FRANCA. Among other useful revisionary matter the authors give a list of the American species of Phlebotomus.

ii. Description and figures of male and female of *Phlebotomus mazzai*, another new species from the Jujuy district. The numerous characters distinctive from *P. araozi* are tabulated.

A. A.

LEGENDRE (J.). Sur l'existence de phlébotomes à Ouagadougou (Haute-Volta). [**Existence of Phlebotomus in Upper Volta.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 342–344.

The author reports the occurrence of Phlebotomus at Ouagadougou in the Upper Volta colony of French West Africa: it is very rare there, but least so in the dry season (January to May). Phlebotomus fever is not known at Ouagadougou.

A. A.

YOUNG (T. C. MCCOMBIE) & CHALAM (B. S.). **Two New Sandflies from Bombay.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 849–862. With 8 figs. on 1 plate. [5 refs.]

Descriptions, differential diagnoses, and illustrative figurings of *P. chalami* and *P. colabaensis*. The latter species is based upon a single male specimen.

A. A.

NIESCHULZ (Otto). Zoölogische bijdragen tot het surraprobleem. VIII. Over Tabaniden-Broedplaatsen op Java en Sumatra. [**Tabanoid Breeding Grounds in Java and Sumatra.**—*Nederl.-Indische Bladen v. Diergeneesk.* 1927. Feb. Vol. 39. No. 1. pp. 1–41. With 12 figs. on 6 plates & 2 maps in text. [German summary pp. 41–45.]

[It is well-enough known that the larvae of Tabanidae are found—either in the water itself or in the sand or mud of the shore of pools and ponds, and sometimes in earth at a considerable distance from the water—in almost any kind of land where the adult flies can find food. The reviewer has found them in collections of seepage in the bare bouldery waste that stretches for some miles round Dungeness, where

the only wild animal one sees is an occasional hare, and the only domestic animals are the few goats and fowls of the few folk who live about the distant lighthouse and signal-station]. The breeding-grounds are not always easy to hit, and the author, in Java and Sumatra, must be congratulated in having found 148 of them, from which he collected 1,909 larvae and pupae and hatched 747 adults of seven species of Tabanus (348 *T. rubidus*, 166 *T. striatus*, 104 *T. rufiventris*, and 5 all told of the other 4 species) and of 3 species of Chrysops (*C. dispar* 100, and 23 of the others). He describes the various breeding-grounds and gives a dozen fine pictures of some of them. They are situated in and about rice-fields, and in and about pools in pasture-lands, open plains, coconut plantations, woodlands, swamps, buffalo kraals, and the sea coast (salt water), and fish-ponds, also in and beside brooks in open land and woodland. And he comes to the very obvious conclusion that an attempt to get rid of Tabanus and Chrysops by destroying the homes of their larvae is not very encouraging (in de practijk vrij wel onuitvoerbaar is).

A. A.

Courtis (Baudilio). Miasis de saco lagrimal. [**Myiasis of the Lachrymal Sac.**]—*Semana Méd.* 1927. May 26. Vol. 34. No. 21 (1741). pp. 1307–1309. With 2 text figs. [35 refs.]

The patient, a man of 70, during the last year had noticed a swelling the size of a small shot in the region of the left lachrymal sac. A month prior to coming for treatment it was the size of a chick-pea and was accompanied by intense itching and the passage of viscid fluid from the duct-opening. Six days later when seen by the author, there was much painful swelling and oedema of the surrounding parts. Yellowish-white pus was evacuated and three living larvae, which, after removal, pupated and finally proved to be *Calliphora vomitoria*.

H. Harold Scott.

Bezzi (Mario). **Some Calliphoridae (Dipt.) from the South Pacific Islands and Australia.**—*Bull. Entom. Res.* 1927. Mar. Vol. 17. Pt. 3. pp. 231–247. [6 refs.]

This is a purely taxonomic paper. Having recently studied a large collection of Muscid flies from the Fiji Islands, and a number of species from Samoa and other South Pacific Islands as well as material from New Zealand and E. Australia, the author has made a revision of the Calliphoridae and describes here some new species.

A. A.

Faggioli (R.). "Eristalis tenax," parásito accidental del cuerpo humano. [*Eristalis tenax*, **an Accidental Parasite of Man.**]—*Semana Méd.* 1927. Apr. 7. Vol. 34. No. 14 (1734). p. 887.

Case of a child of 15 months with a history of intestinal disturbance, abnormal appetite, and discharge of worms (hilitos, gusanos), who was observed to pass larvae of *Eristalis tenax* ("rat-tailed larvae"). Treatment consisted of calomel and santonin.

A. A.

Ferguson (Eustace W.). **Tabanidae of the Samoan Islands.**—*Bull. Entom. Res.* 1927. Mar. Vol. 17. Pt. 3. pp. 315–316. With 1 text fig.

Tabanus samoensis is here recorded as the first representative of the Tabanidae brought from the Samoan Is., and is described as a new species.

A. A.

LLOYD (Ll.), JOHNSON (W. B.) & RAWSON (P. H.). **Experiments in the Control of Tsetse-Fly. (Report of the Tsetse Investigators in N. Nigeria.)**—*Bull. Entom. Res.* 1927. June. Vol. 17. Pt. 4. pp. 423–455. With 1 map, 13 charts & 4 figs. on 2 plates. [6 refs.]

This report is a continuation from January, 1924 to May 1926. It deals with *Glossina morsitans* and *tachinoides*. A considerable part of it is devoted to description of routine observation of the bionomy and the trypanosome infections of these two species.

An experiment of excluding game from half a square-mile of country where *morsitans* had been studied for a year and *tachinoides* for two years is described. The enclosure included a long, narrow, shallow pond surrounded by thicket. Beyond it on two sides was a wide plain almost shadeless in the dry season, on another side a patch of heavy forest, and on the fourth side a river with an intervening half-mile of drying swamp. The enclosed thicket gave cover to various antelope and the warthog, besides monkeys and porcupine and various small carnivora, and was visited by larger Ungulates, lion and hyaena. Bird life was very varied and wonderfully abundant, and Monitor lizards and large snakes (and possibly the crocodile) were there. The fencing, three inches of which was buried, consisted of 5½-foot, 4-inch mesh, 14-gauge wire-netting, double in half its height, and was fixed to wooden posts at five-foot intervals. The total cost, including labour of construction (average of 80 day-labourers for ten weeks) came to £700. After the enclosed area had been cleared of game larger Ungulates continued to haunt the outskirt (which—as well as the periphery of the enclosure—was kept clear of grass for a width of 15 feet), but in the second dry season " the fence had a deterrent influence over a considerable area " outside it. Occasional attempts to break or leap the wire were made, and a duiker may perhaps have slipped through, but on the whole the fencing answered its purpose. The result of exclusion of game is thus summarized.

The removal of game " set up a state of starvation in *morsitans* and to some extent in *tachinoides*. There was a marked reduction in the abundance of both species, especially in *morsitans*. More blood than usual was taken by *morsitans* from birds, and both species contained a larger proportion of blood of human type than is usual. Invasion of the enclosed area by tsetse from outside vitiated the experiment and resulted in certain anomalies, *viz.*, that the rate of trypanosome infection remained high ; the blood content was not appreciably decreased ; the proportion of very young flies increased abnormally in *morsitans*. It is considered that game destruction, if it could be accomplished, would lead to a disappearance of *morsitans*, but not of *tachinoides*, and for this reason no policy of game destruction is recommended, but a policy of *laissez faire* towards the game in Northern Nigeria, so that there may be no increase in the wild Ungulata, which results in increase and spread of fly."

The authors, however, do not claim that their experiment has been satisfactory, although it has yielded a good deal of information. They object that the experiment has been carried out in a " secondary focus " of tsetse-fly—[a " secondary focus " being comparable with a favourite spa with its naturally fluctuating population of tourists and temporary residents]. They insist that the experiment could be convincing only if it were carried out in a " primary focus " where there is always a resident population regularly increasing to and beyond the limit of available sustenance.

Details are given of an experiment in deferred grass-burning. The sweeping fire caused a great mortality of *morsitans* and *tachinoides*, both adults and pupae. Although hardly affecting the established thicket it probably checked expansion of thicket. It is thought that late-firing, well organized, would be an effective check, though very difficult to arrange in Northern Nigeria.

A preliminary account is given of the beginning of an experiment in clearing with subsequent settlement, only the main route through the area and the thicket fringing the pools being cut down.

An account is given of an unsuccessful attempt to introduce the Chalcidid parasite *Syntomosphyrum glossinae*. [The experiment was of a cruder kind than the one in Nyasaland described by LAMBORN (*Bulletin*, Vol. 22, p. 291 and above), the results of which LAMBORN, too, now considers to be not vastly promising].

A. A.

HARRIS (R. H.). **Tsetse Fly in Zululand. Control Methods tried by Felling Trees.**—*Farming in S. Africa.* Pretoria. 1926. May. Vol. 1. No. 2. pp. 58–60. With 9 text figs.

From of old it seems to be well known in Zululand that tsetse-flies avoid large open expanses of grass that are clear of tree and bush. The object of the experiment here described was to discover what width of such open space will stop the flies. In the midst of a patch of fly-haunted bush a circus track having a breadth of fifty yards was cleared, the core of bush within the ring being 4 or 5 acres in extent ; the felled trees were piled at the outer edge of the ring to stop the entrance of animals from the bush beyond. During sixteen months the cleared ring was regularly crossed by fly from beyond. By two or three subsequent operations the breadth of the cleared circus was increased outwards to 300 yards, the felled trees being left lying ; but instead of a decrease there has been an increase in the incoming of fly due, it is thought, to the attractions of the labourers. The effect of removing the felled trunks and making a perfectly clean zone 400 yards broad between the observation core and the bush beyond is to be observed next.

A. A.

TANGANYIKA TERRITORY. **Summary of Tsetse Work done in Tanganyika Territory.** [SWYNNERTON (C. F. M.), Director, Game Preservation Dept.] Mombasa : 1927. Jan. 15. 12 pp. F'cap. [Received from the Colonial Office July 26, 1927.]

This type-script report contains a full and lively account of all that has been and is being done, and we may select for notice, as being matter of general interest, that part of it which describes the successful operations for tsetse-fly control in the Shinyanga sultanate, where work on a large scale was started in 1924. Here 54 square miles have been cleared, so far, the method adopted being thicket-clearing and late-burning ; [but whether this is the basis of the "successful and economical method of destroying bush permanently," separately mentioned, is not evident]. Twenty square miles are stated to have thus been actually freed of fly (*G. swynnertoni*) ; while by fires alone over another area of about 200 square miles the numbers of fly have been reduced—as estimated by average daily catches—to less than 2 per cent. of the 1924 numbers. Natural birdlime, on dummies and vehicles

and men, has been found fairly useful as an auxiliary. A thousand settlers and 40,000 head of cattle have been brought into the cleared tracts, and a thousand goats have been distributed among the settlers to test their usefulness [well—and often too well—demonstrated in other parts of the world] in keeping down scrub. On the other side of the account, the Tabora-Mwanza Railway is said to be carrying fly into clean country as well as into the cleared areas in Shinyanga.

Thousands of workmen are employed in these operations of reclaiming the country from fly, and even the voluntary workers must be supplied with meat.

The chief needs for carrying the work to a successful issue are—besides men and money—motor transport, and legislation for the control of grass fires.

A. A.

SCHWETZ. La limite actuelle de la *Gl. morsitans* autour d'Elisabethville (Katanga) avec quelques considérations sur les causes du recul progressif de cette mouche. [**The Present Limits of** *G. morsitans* **around Elizabethville. The Causes of its Progressive Retirement.**—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 78–87. With 1 map in text. [1 ref.]

After ample and attentive observation the author endorses RODHAIN's statement that *Glossina morsitans*, which undoubtedly was on the spot when Elizabethville was established in 1910, no longer now exists in the neighbourhood of that town. Along the frequented route to the north-east it is hardly to be discovered within 90 km.; along the route to the south-west he has had to search for 25 to 30 km. before finding it; while to the south he has not been able to procure a single specimen (for reward offered) within 125 km. In accounting for this disappearance he attributes it chiefly to the disturbance and destruction of game. He admits that there may be some other contributory circumstances, still to be discovered; but he insists that alone of all the tsetse-flies *G. morsitans* is so strictly necessitated to game that it cannot survive its extinction even in an area where man and his domestic animals have already become settled.

A. A.

ARCHIBALD (R. G.). **The Tsetse Fly-Belt Area in the Nuba Mountains Province of the Sudan.**—*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 39–44. With 3 figs. on 1 plate & 1 map.

As far as can be ascertained from dry-season observations this fly-belt is limited to the Koalib Hills (running north and south between lat. 11°·31′ to 11°·52′ N. and long. 30°·31′ to 30°·30′ E.), and to certain localities (well-known to the natives of the hills) adjacent to the grazing-grounds there. The local fly is *Glossina morsitans*, which appears to be dependent mainly on the small native cattle, these being said to be immune to trypanosomiasis; wild game is absent, and man is said to be not molested. Blood from horses in the district has been found infected with *Trypanosoma pecaudi* and *congolense*. No case of human trypanosomiasis has been recorded locally, but facilities for obtaining information have been few.

A. A.

IOFF (I.) & EFREMOWA (N.). Zur Frage ueber Fauna und Biologie der Flöhe an Haustieren in Mittelasien. [**Fleas on Domestic Animals in Central Asia.**]—*Pensée Méd. d'Usbekistane.* Taschkent. 1927. No. 3–4. German summary pp. 234–235. [In Russian pp. 167–174.

The common fleas of domestic animals in Central Asia are said to be *Ctenocephalus canis* and *felis*, *Pulex irritans* (8 per cent.), and *Echidnophaga gallinacea*—the last being also a common parasite of various wild animals. Fleas swarm suddenly in May and June, decrease in numbers in summer, increase again for a short time in September, their numbers in winter being variable, except in the case of *E. gallinacea*, which in winter almost forsakes domestic animals.

A. A.

WAGNER (J. A.). Sur les aphaniptères rassemblées en 1913 par les compagnies épidémiologiques au Sud-Est de Russie. [**Fleas collected in 1913 in South-East Russia.**]—*Arch. Sci. Biol.* 1926. Vol. 26. No. 1–3. French summary pp. 201–202. [In Russian pp. 103–113.]

This appears to be another version of a paper already noticed in this *Bulletin* (Vol. 23, p. 873), with the addition of a key for identification of the fleas described.

A. A.

INGRAM (A.). **New Fleas from South African Rodents.**—*Bull. Entom. Res.* 1927. Mar. Vol. 17. Pt. 3. pp. 289–293. With 4 text figs.

Descriptions of 2 species of fleas from Karroo rats and 1 species from the golden rock-mouse.

A. A.

MAZZA (Salvador) & FRIAS (Dardo). Nota sobre accidente producido por larvas de *Hyperchiria coroesus* (rupa chico). [**Symptoms produced by Larvae of** *H. coroesus.*]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 531–533. With 1 text fig. [4 refs.]

The author mentions some of the urticating lepidopterous larvae of the Argentine and describes and figures the big bristly-plumed caterpillar of *Hyperchiria coroesus*. This remarkable creature, which attains a length of 6 cm., is of a verdant green colour and carries erect on its back rows of long, stout bristling feathers. In the vernacular it is known as *rupa chico*, and usually it is found on shrubs called *guaranguay* (two species of *Stenolobium*). It is common in the northern districts of the Argentine, and the barbs of its feathery bristles cause a dolorous inflammatory urticaria.

A. A.

MYERS (J. G.). **The Habits of** *Alysia manducator* **(Hym., Braconidae).**—*Bull. Entom. Res.* 1927. Mar. Vol. 17. Pt. 3. pp. 219–229. [3 refs.]

Alysia manducator is a parasitic Hymenopteron of the Braconid family. The female lays usually a single egg in a well-grown Muscid maggot. Little development occurs until the Muscid maggot pupates, but then the Alysia larva consumes the Muscid pupa and finally spins its own cocoon

and undergoes its own metamorphosis in the empty Muscid puparium, the adult Alysia emerging a few weeks later in summer, but not until the following year in the case of eggs deposited in their host-maggot in autumn. The Alysia does not restrict its range to any particular host species, although it has strong preferences, among which are species of Lucilia and Calliphora. The observations on Alysia here recorded are merely supplementary to the classical studies of GRAHAM-SMITH (*Parasitology*, Vol. VIII, 1916 and Vol. XI, 1919).

A. A.

DE CASTRO (A. Bayley). **The Effects of Bee Venom.**—*Indian Med. Gaz.* 1927. May. Vol. 62. No. 5. pp. 252–253.

Does not contain anything original about bee-venom, although there are some interesting cases illustrating the well-known facts that an angry bee does not always sting nor always inject all the venom in its poison-bag, and that a swarm of angry bees which will certainly attack a man who flees or tries to drive them off may take no notice of a man who remains perfectly still and self-collected.

A. A.

PAVLOVSKY (E. N.) & STEIN (A. K.). Experimentelle Untersuchung ueber die Giftwirkung von *Paederus fuscipes* Curt. (Coleoptera, Staphylinidae) auf den Menschen. [**Study of the Poisonous Action of** *P. fuscipes.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. June. Vol. 31. No. 6. pp. 271–282. With 4 text figs. [9 refs.]

—— & ——. **The Cutaneous Poison of the Beetle,** *Paederus fuscipes.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 450–451.

Staphylinid beetles of the genus *Paederus* have an almost world-wide notoriety by reason of the rather violent dermatitis that they can cause in man. This paper contains an elaborate account of the toxic properties of *P. fuscipes* and of their pathological effects upon the human skin. The toxin occurs in the insect's blood and, in a less degree, in its reproductive organs, male and female; the noxious effects occur only when the human skin is broken—as is likely to happen when the insect is crushed upon the skin.

A. A.

BOGEN (Emil) & BERMAN (Phoebus). **Poisonous Spider Bites, with Especial Reference to the** *Latrodectus mactans.* **A Clinical and Historical Study of a Widespread but Little Known Condition.**—*California & Western Med.* 1927. Mar. Vol. 26. No. 3. pp. 339–341.

Lathrodectes mactans is a spider of a genus that is represented in warm countries all round the globe. This particular species is common in certain parts of America, being variously known locally as the "black-widow," "shoe-button," and "hourglass" spider, and is notorious for the painfully serious effects of its bite. The authors give here brief summaries of 15 cases of this spider-bite that have been treated at the Los Angeles Hospital during recent years—8 of them during the last year.

Most of the cases are of men bitten when using outdoor privies, who saw and described the spider; and since there still lingers a tendency to

under-rate the virulence of Lathrodectes-venom the authors' generalized version of its effects, based on their own actual observations of hospital cases, is given verbatim.

"In no instance was there any marked swelling or inflammation present at the site of the bite. Severe pain, arising soon after the bite and increasing in intensity for an hour or two, was a constant complaint. It started generally in the neighbourhood of the bite, but soon spread, and was localized in the abdomen and legs in nearly all of the patients, but was also felt in the chest, arms, genitals, groins, back, and "all over" in many. The pain, which was described as intense, excruciating, agonizing, severe, throbbing, cramping or aching, and was evidenced by writhing, tossing, doubling up and moaning, persisted for from four to eight hours undiminished and then gradually subsided during the course of the next 24 hours, but complete relief was not experienced for a number of days, and often not for a week.

"Profuse perspiration, restlessness, nausea and vomiting, constipation, and dyspnoea were prominent symptoms, but vertigo, ataxia, chills, urinary retention, localized edema, and persistent hiccough were also noted. The abdomen was extremely rigid, but tenderness was usually absent, the reflexes were hyperactive, and priapism was noted in one instance.

"A mild fever, generally around 100 and in no case going above 101·6, was usually found, but the daily fluctuation in temperature was increased, and many of the patients showed a subnormal temperature at some time. The pulse was generally slow as compared with the temperature, being below 66 in more than half of the patients at some time, and the respiration, although occasionally accelerated for short periods at first, soon approximated a normal rate. The blood pressure was elevated in every instance, averaging 150 mm. mercury systolic with 87 diastolic on admission, but dropped rapidly on later readings. Leukocytosis was present on admission, averaging 14,800 in the cases examined on the first day in the hospital, the highest count being 21,800, but by the third day the average white blood count was only 10,700, the lowest being 5,900. There was generally a relative increase in the polymorphonuclear leukocytes on the date of admission. The red blood count was variable, being above normal in several instances, and the color index was about one. Four of these patients had a positive Wassermann reaction. A trace of albumin and a few hyaline or granular casts were found in the urine in six cases, and blood was reported once."

"The treatment at the Los Angeles General Hospital consisted of: (1) Sedation, with morphin, codein, bromides, chloral, veronal and hot applications; (2) stimulation, with spirits of ammonia, caffein and strychnin; and (3) elimination, with magnesium citrate or Epsom salts, castor oil, calomel, enemas, catheterization, and gastric lavage. Although we have not yet had a fatality, the large doses of narcotics required to give adequate relief made it desirable to seek some more efficient form of treatment. Convalescent serum was given intramuscularly in the last four severe cases. The results, while not absolutely conclusive, are sufficiently encouraging to warrant the continuation of the use of this treatment, and accordingly a supply of convalescent serum is now kept at the hospital in readiness for this purpose."

A. A.

KOROWNIKOW (A. F.). [Contribution à l'étude de la symptomatologie de la piqûre du Lathrodectus ("Kara-Kourte").] [**Symptoms of the Bite of Lathrodectes.**]—*Pensée Méd. d' Usbekistane.* Taschkent. 1926. Vol. 1. No. 1. pp. 12–16. With 2 text figs. [In Russian.]

An account from Turkestan of a case of spider-bite from *Lathrodectes tredecimguttatus*, known in Russia as "Kara-Kourte." The bite had

the appearance of a pin-prick. The subject, examined after two hours, was breathing with difficulty and complained of generalized pains and headache. There was numbness of and inability to move the extremities. The face and body were in a cold sweat, but the extremities were cold and dry. The abdomen was swollen, the patient complaining of a feeling of heaviness and suffering from frequent eructations. The pulse was 100 and irregular. During the day the pulse improved, but the other symptoms were still present, the condition of the patient gradually improving during the second day. On the third day the patient was able to walk about, a general weakness being the only symptom left. In addition to camphor, sodium benzoate, and sodium sulphate the patient received some heroic treatment by native methods : the offensive spider was ground with oil and the mixture applied to the puncture ; and towards the evening of the first day the patient was placed on the floor face downwards while three natives trampled on his back.

The author notes that the venom of Lathrodectes evokes no local symptoms, but apparently produces a rapid general intoxication. In Turkestan the "Kara-Kourte" is usually encountered in arid "wormwood" (*Artemisia*) deserts, and is introduced into human dwellings with the (wormwood) fuel.

C. A. Hoare.

JACKSON (E. S.). **The Red-Backed Spider Bite.** [Correspondence.]—*Med. Jl. Australia.* 1927. Apr. 2. 14th Year. Vol. 1. No. 14. pp. 524–525.

Accounts of spider-bite in the daily Press have moved the author to record his own experience of a fatal case that occurred in Queensland about forty years ago. The victim was a boy of 3 or 4 years ; he was bitten in the groin, and a "red-backed spider" [probably a Lathrodectes] was found in his clothing. The marks of the poison-claws were visible when the child was brought to the Brisbane Hospital, "dull and heavy," 18 hours afterwards. "Death ensued within 36 hours at most after admission," and at the necropsy the whole chain of lumbar glands was found to be enlarged and engorged—the only abnormality discovered.

A. A.

MCKAY (Stewart). **The Red-Backed Spider Bite.** [Correspondence.]—*Med. Jl. Australia.* 1927. Apr. 23. 14th Year. Vol. 1. No. 17. pp. 626–627.

This is a discursive review of the subject of animal toxins with particular reference to the venom of the species of Lathrodectes popularly known in Australia as the red-backed spider. The author makes the not unreasonable suggestion that the bite of this spider should be treated on the same principles as snake-bite.

A. A.

DUNN (Lawrence H.). **Notes on Two Species of South American Ticks,** *Ornithodoros talaje* **Guerin-Mene., and** *Ornithodoros venezuelensis* **Brumpt.**—*Jl. Parasit.* 1927. Mar. Vol. 13. No. 3. pp. 177–182. [5 refs.]

The careful observations of this author lead him to the conclusion that of the two species of Ornithodorus, *venezuelensis* and *talaje*, prevalent

in various northern parts of South America, *venezuelensis*, which is found in considerable numbers in many human habitations attacking the occupants, is the principal transmitter of relapsing fever in tropical America. *O. talaje* has been shown by experiment to be capable of transmitting the disease, but since it is commonly found on rats in its larval stage, it is assumed that its nymphs and adults feed on rodents and other animals and only attack man in extreme necessity.

A. A.

SCHWETZ (J.). Note sur les Ixodidae (tiques) du Katanga. [**Ticks of the Katanga.**]—*Rev. Zool. Africaine.* 1927. Apr. 1. Vol. 15. No. 1. pp. 65–72.

——. Contribution à l'étude des Ixodidae (tiques) du Congo belge. (D'après les collections du Musée Royal d'Histoire naturelle de Bruxelles. (Deuxième note). [**Ticks of Belgian Congo.**]—*Ibid.* pp. 73–80.

——. Contribution des Ixodidae (tiques) du Congo Belge. (D'après la collection du Musée du Congo belge de Tervueren-Bruxelles.) (Troisième note.)—*Ibid.* pp. 81–92.

The most noteworthy point in these lists of ticks is the inclusion of *Argas persicus*, which species has now been discovered in Elizabethville and other places in Katanga.

A. A.

VOGEL (R.). Einige Beobachtungen ueber Zecken Kleinasiens. [**Observations on Ticks of Asia Minor.**]—*Cent. f. Bakt* I Abt. Orig. 1927. July 1. Vol. 103. No. 1–3. pp. 119–123. [8 refs.]

Pleasing, unsophisticated, summer holiday observations and comments on ticks in Anatolia, the species noticed being *Ornithodorus lahorensis* (which the author thinks may be identical with *canestrinii*), *Hyalomma syriacum*, *H. aegyptium* and *H. pusillum* and its subspecies *alexandrinum*, *Rhipicephalus sanguineus* and *Haemaphysalis otophila*.

A. A.

HIRST (Stanley). **The Principal Species of Acari Parasitic on Rats, with Brief Notes on Hosts and Distribution.**—*Jl. Ceylon Sci.* (Sect. D. Med. Sci.) 1926. Dec. 18. Vol. 1. Pt. 4. pp. 273–276. With 7 plates. [6 refs.]

Along with a list of 7 species of mites of the Gamasid family that occur on rats the author gives a key for distinguishing the 7 blood-sucking genera of that family which have been found on those rodents. He regards the species of Dermanyssus and Liponyssus as those most likely to be dangerous to man, since Liponyssus from the rat has been observed on man in several distant parts of the globe, and the common Dermanyssus of poultry frequently bites human beings.

A. A.

HORA (Sunder Lal). **The Use of Fishes for the Control of Mosquitoes.**—*Indian Med. Gaz.* 1927. Apr. Vol. 62. No. 4. pp. 187–188.

This is a discursive article. The author draws attention to the insufficient use of fish for anti-mosquito work in India and also to the absence—except only in Madras—of any machinery for supplying larvicidal fishes were they in request. He emphasizes the necessity of clearing ponds and "tanks," into which larvicidal fishes are to be introduced, not only of vegetation but also of any existing carnivorous

fishes ; and he takes this opportunity of criticizing the well-intentioned efforts of certain benevolent officials in India who are propagating the predaceous and exceedingly tenacious *murrel* (Ophiocephalus) in the tanks within their jurisdiction. This criticism gives point to his argument that the study of bionomy should precede the confident advances of the "practical" man, and gives license to his offer, made in behalf of the Zoological Survey Department of India, of preliminary co-operation in these and other kindred matters.

A. A.

LETSCHENKO. Sur la déglutition des sangsues en Asie Centrale, son diagnostic et ses moyens d'extraction. [**Deglutition of Leeches in Central Asia.**]—*Pensée Méd. d'Usbekistane.* Taschkent. 1927. Vol. 1. No. 3–4. French summary p. 232. [In Russian pp. 124–129. 10 refs.]

In Central Asia leeches often happen to be imbibed in drinking water and to attach themselves to the wall of pharynx and gullet, remaining attached sometimes for weeks or even months, and then causing grave anaemia. They may even happen to be swallowed, but are soon killed in the stomach. A strong solution of common salt loosens a leech from its hold, and it can then be removed by forceps.

A. A.

BISWAS (L. M.) ; STRICKLAND (C.). **A Strange Parasite of Man. With a Note on the Polychaete in the Human Nasopharynx.**—*Indian Med. Gaz.* 1927. May. Vol. 62. No. 5. pp. 256–257. With 1 text fig.

This so-called parasite of man is a living individual marine polychaete worm of the genus Nereis—a mature active individual about an inch long—that was discharged in muco-pus and with much coughing and sneezing from the nose of a patient in the course of an acute and painful attack of a coryza due to, or aggravated by, the presence of the worm. The patient was a Hindu blacksmith of Calcutta who was accustomed to bathe in the Ganges (Hugli). Although Nereids are typical marine worms, some of them, like a great diversity of other marine animals, have considerable powers of adaptation to the sundry tidal and seasonal variations of delta waters such as the Hugli at Calcutta ; so that there is nothing very strange in the appearance of a Nereis in that river.

What is remarkable is that the creature should have found its way unnoticed into a man's nasopharynx, and, having done so, could have lived there for a week or more. Strickland contributes a learned discussion of this phenomenon ; [and the question will probably—like the *Pachydrilus lineatus* question (see this *Bulletin*, p. 439, *ante*)—give rise to further discussion on the exuberant subject of "parasitism."].

A. A.

SESHACHALAM (T.). **An Unusual Foreign Body in the Ear.**—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. p. 145.

The unusual body in this case was a young scorpion, an inch long, and "found to be alive."

A. A.

ROXBURGH (A. C.). **The Treatment of Insect Bites and Stings.**—*Lancet.* 1927. May 28. 1146–1147.

Does not contain anything novel either in principle or practice.

A. A.

SHERWOOD (J. W.). **Insect Pests in Texas.**—*Milit. Surgeon.* 1927. May. Vol. 60. No. 5. pp. 581–587.

A useful list of " the indigenous disease-transmitting ' insects ' [Arthropoda] or potentially disease-transmitting ' insects ' [Arthropoda], and of those ' insects ' [Arthropoda] which, because of prevalence in large numbers throughout most of the year, constitute a pest " in Texas.

A. A.

DO AMARAL (Afranio). **The Snake-Bite Problem in the United States and in Central America.**—*Fifteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1926. pp. 229–237. With 8 text figs.

The author estimates that about 1,000 cases of venomous-snakebite occur annually in the U.S.A., the mortality ranging from about 10 per cent. in the north to about 25 per cent. in the south-west (where also the number of cases is greatest). He believes that the conversion of jungle into arable land " aggravates the dangers of ophidism," since corn means increase of the rodents on which vipers feed and multiply and also increase of human beings to get bitten by serpents. Fortunately, an Antivenin Institute of America has been started by the joint endeavour of certain private individuals and scientific societies and with the participation of the United Fruit Company.

A. A.

COX (Wesley C.). **First Aid Treatment in Cases of Poisoning due to Rattle Snake Bite.**—*Milit. Surgeon.* 1927. July. Vol. 61. No. 1. pp. 53–55.

The treatment here described in great detail consists after application of the tourniquet, of free crucial incision not only at the site of the bite but also in the area round about, followed immediately by suction (by mouth, if apparatus be not available). Suction is to be prolonged for about half an hour, and is to be repeated at least once and if necessary at intervals while incisions are draining or any swelling exists. After the second suction a dressing of hot saturated solution of magnesium sulphate is applied to cover all incisions. " The patient is watched to determine if constitutional symptoms develop. In such a circumstance serum is indicated."

This treatment is stated to have proved efficacious both by experiment on animals and in cases of rattlesnake bite ; but the experiments and the cases treated are not described or further mentioned.

A. A.

WADA (Heimu). **Experimental Studies on Treatment of Bites of Snakes.** (*Agkistrodon blomhoffi* **Boie.**)—*Japan Med. World.* 1927. Feb. 15. Vol. 7. No. 2. pp. 35–41.

The poisonous snakes of Japan are species of Lachesis and Ancistrodon, and the author deals with the latter.

The bite of Ancistrodon causes pain and local swelling and extravasation, which may be followed by local necrosis ; it is very rarely fatal.

Being satisfied that for all practical purposes local treatment is sufficient, the author proceeded to test the effects of $KMnO_4$ and H_2O_2 on rabbits, for which animals the M.L.D. of Ancistrodon venom he found to be 4 mgm. [The paper is not of great intrinsic value since the author appears to ignore all previous experimental work on the action of $KMnO_4$ upon snake-venom.]

A. A.

i. WATKINS (Arthur). **Treatment of Snake Bite.** [Correspondence.]—*Med. Jl. Australia.* 1927. Apr. 30. 14th Year. Vol. 1. No. 18. p. 665.

ii. MACINNES (A.). **Treatment of Snake Bite.** [Correspondence.]—*Ibid.* May 21. 14th Year. Vol. 1. No. 21. p. 771.

i. Describes the treatment adopted in the case of an Australian aborigine bitten by a tiger-snake [*Notechis scutatus*] and brought-in, collapsed, two hours after the accident. A loose ligature had been applied, and dry $KMnO_4$ some time in the interval. The author reinforced this local treatment and then administered 2 oz. of the aromatic spirit and 20 grains of the plain carbonate of ammonia, by mouth and per rectum respectively, followed in 5 minutes by another oz. of the aromatic spirit. This treatment having been speedily effective the author recommends it, without qualification, for general edification.

ii. This is a rather sharp criticism of the above paper. This author makes the legitimate inference that the patient was suffering from shock, but also makes the unnecessary assumption that the cause was not a snake-bite. He condemns the use of $KMnO_4$ as a "fetish" and recommends as the ideal treatment for the bite of a venomous snake—aside from the continued administration of cardiac and respiratory stimulants—to apply a tourniquet above the wound and then at regular intervals (20 minutes or so) to loosen the tourniquet for a moment in order to allow a small dose of the inoculated venom to enter the circulation and thus in time to produce immunity. "In any part of the body not fitted for the use of a tourniquet the only rational treatment is immediate excision of the tissue containing the venom, at the same time expressing a pious hope that no venom has been left behind."

[Neither of these authors refers to antivenomous sera or to the impressive experimental work done in many parts of the world, including Australia, on snake-venom and the rational treatment of snake-bite. The papers, however, are instructive as illustrating the fallacies imbedded in the assumption that "snake-bite," even in its application to a specific venomous snake, is a precise term with definite implications].

A. A.

SUZUKI (Yasuju). **Studies on the Antidotal Action of the Ash of Oyster's Shell for the Viper's Poison.**—*Sei-I-Kwai Med. Jl.* 1927. Apr. Vol. 46. No. 4. English summary pp. 39–40. [In Japanese.]

Since the ash of oyster-shell has been supposed to be a remedy for viper-bite the author has investigated its properties. He finds that it adsorbs viper-venom *in vitro*, its power of adsorption being four-times that of Kaolin and being dependent upon its calcium hydroxide and oxide constituents.

A. A.

BELFANTI (Serafino). I veleni degli animali nella biologia. [**Animal Venoms and their Biology.**]—*Biochem. e Terap. Sperim.* 1927. Jan. 31. Vol. 14. No. 1. pp. 7–21. [26 refs.]

This article, though occupied largely with the remarks on the work of others, brings forward some interesting points which might well be followed up. Snake-venoms are chiefly dealt with. The author is of opinion that all snake-venoms are haemolytic if the three factors—red cells, lecithin, and poison—are all present; if the second is absent or deficient there will be no haemolysis. Thus, cobra venom will haemolyse the corpuscles of man, dog, horse, rabbit, guineapig, but not those of the ox, sheep or goat. He states that one-twentieth or even a thirtieth of the dose of Naia venom lethal to certain fish will prove fatal if lecithin is added, as a small quantity of yolk of egg.

H. Harold Scott.

KAGAIA (Y.). Ueber die präzipitierende Wirkung des Schlangengiftes, insbesondere des Kobragiftes. [**The Precipitating Action of Snake Venom, especially Cobra Venom.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1927. Feb. 14. Vol. 50. No. 1-2. pp. 1–30. [16 refs.]

The present studies on snake venoms—particularly cobra venom—are wholly serological and deal with their precipitation reactions (with sera and aqueous extracts of various species of animals) under varied experimental conditions of concentration, temperature, chemical association, etc., and with the relations between toxicity and precipitation property and between precipitation and complement destruction.

A. A.

KATAHIRA (S.). Ueber die Veränderung des Blutbildes von Kaninchen nach Injektion der Gifte der wichtigsten Giftschlangen von Formosa. [**Change of Rabbit's Blood Picture after Injection of Snake Venoms of Formosa.**]—*Taiwan Igakkai Zasshi.* (*Jl. Med. Assoc. Formosa*). 1927. May. No. 266. German summary pp. 1–2. [In Japanese.] [Govt. Research Inst., Formosa.]

The various effects upon the corpuscular elements of the blood (of the rabbit) that follow injections of venom of, severally, *Lachesis gramineus*, *L. mucrosquamatus*, *Ancistrodon acutus*, Naja, and Bungarus, are here described in detail, but they cannot be condensed or generalized.

A. A.

ROSSIGNOLI (J. J.). Modifications physiques et chimiques du plasma sous l'action des venins de serpents *in vivo*. [**Changes in Plasma under Action of Snake Venoms** *in vivo*.]—*C.R. Soc. Biol.* 1927. July 8. Vol. 97. No. 22. pp. 414–415. [Physiol. Inst., Faculty of Med., Buenos Aires.]

A record of physico-chemical modifications of the plasma (of the dog) that follow injections *in vivo* of venom, severally of *Lachesis alternatus*, *L. neuwiedii*, and *Naja tripudians*. There follows a similar record of modifications, *in vitro*, of horse-serum caused severally by these venoms and those also of *L. ammodytoides* and *flavoviridis*, and *Vipera russellii*. Details not amenable to abstraction.

A. A.

ASHWORTH (J. H.). The Distribution of Anopheline Mosquitoes in Scotland.—*Proc. Roy. Soc. Edinburgh.* 1926–1927. Vol. 47. Pt. 1 (No. 6). pp. 81–93. With 1 map. [15 refs.]

CHATTERJEE (G. C.). A Note on the Method of Multiplication of Trichomonad Flagellates of Different Species in Artificial Culture.—*Jl. Dept. Sci.* Calcutta. Vol. 8. pp. 15–20. With 2 plates.

FIELDING (J. W.). Australasian Ticks.—*Commonwealth of Australia. Dept. of Health. Service Publication (Tropical Division) No. 9.* 114 pp. With 36 figs. & 1 plate. [Numerous refs.]

GIGLIOLI (G.). Observations sur la morphologie de l'oeuf et de l'embryon chez *Porocephalus clavatus* (Wyman 1845, Sambon 1910).—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 260–270. With 4 text figs. & 2 figs. on 1 plate.

HINSHAW (H. Corwin). On the Morphology and Mitosis of *Trichomonas buccalis* (Goodey) Kofoid.—*Univ. California Public Zool.* 1926. Sept. 14. Vol. 29. No. 7. pp. 159–174. With 2 text figs. & 1 plate. [16 refs.]

MALARIA BUREAU. No. 4. HEALTH BULLETIN. No. 12. 19 pp. With 21 figs. [7 refs.] Table for the Identification of some Indian Fresh-Water Fish. 1927. Calcutta: Govt. of India, Central Publication Branch.

MARTINI (E.). Ueber die Stechmücken der Umgebung von Saratow.—*Arb. der Biologischen Wolga-Station.* 1926. Vol. 8. No. 4–5. pp. 189–227. With 5 text figs.

OKADA (Jô K.). Un cas nouveau de myiase du tube digestif causé par la larve de *Psychoda B. punctata* Curt.—*Ann. Parasit. Humaine et Comparée.* 1927. Apr. 1. Vol. 5. No. 2. pp. 105–106.

SÉJOURNANT. Envahissement péritonéal par des larves d'hypoderme. Péritonite consécutive.—*Rec. Méd. Vét.* 1927. June 15. Vol. 103. No. 11. pp. 340–342.

TRIFFITT (Marjorie J.). Observations on the Oöcysts of Coccidia found in the Faeces of Carnivores.—*Protozoology.* 1927. Apr. No. 3 (Supp. to *Jl. of Helminthology.* pp. 59–64. With 3 text figs. [14 refs.]

ZUELZER (Margarete). Ueber eine Bartonella-artige Infektion der Feldmäuse.—*Cent. f. Bakt.* I. Abt. Orig. 1927. June 8. Vol. 102. No. 8. pp. 449–453. With 1 coloured plate & 1 text fig. [5 refs.]

LEPROSY.

MUIR (E.). **Some Factors which influence the Incidence of Leprosy.**—*Indian Jl. Med. Res.* 1927. July. Vol. 15. No. 1. pp. 1–14. With 3 maps & 3 graphs. [3 refs.]

The importance of high rainfall and humidity in increasing the incidence of leprosy in large areas has been shown by maps of the world and of India by L. ROGERS. The detailed study of smaller areas by means of the Indian census figures brings out other factors. The figures give reliable indications of the relative prevalence of the disease, although they only include evident advanced cases, so under-estimate the true numbers. The zone on either side of the Bengal-Bihar border has been choosen for investigation since it includes the highest leprosy rates in India, the Bankura Thana having the very high rate of 6·36 per mille, falling to 0·32 to the east and to 0·18 to 0·26 to the west, as shown in a map. Bankura is a famine area owing to the rainfall running off the sloping and porous laterite soil, and the people are poor and live on a diet very deficient in milk and fresh vegetables, but consume much decomposed fish ; the late Jonathan HUTCHINSON was correct in his views regarding the relationship of such fish to increased leprosy, but it is only a predisposing cause, and not the main factor in the production of the disease as he maintained. This is also brought out by the very high leprosy rates of 1·12 in the Chin Hills, and 3·97 per mille in the Arrakan Hills, where decomposed fish is also largely consumed, which are low in neighbouring areas where such fish is not used. Leprosy is also more prevalent in the east of the Central Provinces, with porous soil and frequent famines, than in the west of this province. Deficient diet and the consumption of decomposing food thus predisposes to leprosy by lowering the resisting powers of the people. In Burma and in China, with high leprosy rates, there is great deficiency of milk in the diet, but Chinese patients recover rapidly and invariably in Calcutta on the modern treatment combined with a diet including milk, whole-wheat bread and fresh vegetables. In Bihar and Orissa the very poor Bowri caste has from two to five times as high a leprosy rate as other castes, and they consume decomposing carcases and stale rice. In this limited area there is no relationship between leprosy and humidity and rainfall, indicating impoverishment and bad diet as the causes of the local variations. In certain leper asylums with deficient rice diet treatment cannot be expected to give good results, but where gardening and farming allow the inmates to supplement their diet the conditions are more favourable for treatment. Most town leprosy is imported, and the strongholds of the disease in the country must be discovered and dealt with if its prevalence is to be reduced.

L. Rogers.

MUIR (E.). **Leprosy in the Bengal-Bihar Border Line.**—*Indian Med. Gaz.* 1927. Aug. Vol. 62. No. 8. pp. 440–442.

This note gives further data on the lines of the above paper, and emphasizes the necessity of making a careful survey of the local

incidence of the disease, and of supplying dispensary treatment in the main foci of infection if the influx from them into Calcutta and other towns is to be cut off ; doctors especially trained for the purpose should be supplied.

L. R.

SANTRA (Isaac). **Report on Leprosy Survey Work at Manbazar Thana, District Manbhum, Bihar and Orissa.**—*Indian Med. Gaz.* 1927. Aug. Vol. 62. No. 8. pp. 442–444.

This paper deals with such a survey as Dr. MUIR advocates in the foregoing paper. This is a badly affected area. After a list of the known lepers had been obtained, different infected villages were visited, and a lantern lecture given as propaganda work, after which contacts were sought, school children examined, and a dispensary for treatment of lepers opened, with the result that at the end of two months 170 patients had attended. This success led the District Board to open two more clinics, and 633 cases were found, 301 of whom were early ones, excluding 37 refusing examination ; the more advanced cases numbered 295 against 237 previously returned by the village watchmen in the census return. There were thus about twice as many total cases as they had enumerated, nearly all the excess being early cases which they could not be expected to find. Attempts are being made to improve the diet of the people, and periodic examinations of the children of lepers are being made to detect the development of leprosy while in the early amenable stages, and also of school children and servants, who often introduce the disease into houses. Two to four days a week are devoted to treatment and the rest of the time to propaganda work. The root of the disease is thus being struck at in the country areas of high leprosy prevalence. These measures are well worthy of imitation in other infected countries.

L. R.

SOUTH AFRICA, UNION OF. **Annual Report of the Department of Public Health Year ended 30th June, 1926.** [MITCHELL (J. Alexander).]—67 pp. With 1 coloured map. 1926. Pretoria. [Leprosy pp. 18–34.]

This valuable report contains the results of a leprosy survey of South Africa through inquiries by the local magistrates, which showed a total number discovered and certified during a fifteen year period ending June, 1924 of 6,792, of which the Transvaal showed the highest figure with 2,355. Further 1,029 were returned as remaining in their own homes, and it is estimated that 2,240 were at large undiscovered and uncertified. It is stated that these figures are probably too low owing to early cases not being recognized or reported. The number of cases developing annually is about 450, and the total number of lepers in the Union at the present time is estimated at 5,170, or 0·07 per mille. Further, 57 foci of infection were reported from 32 districts, in 12 only of which districts the disease is said to be increasing. The disease appears to be decreasing among the European and mixed coloured races. The lepers segregated in institutions numbered 2,158 in June, 1924, of whom 147 were Europeans and 177 coloured, the rest being natives except for 8 Asiatics. The average duration of the disease before segregation was 6·70 years in Europeans, 7·13 in natives, and 6·64 for all races, and

the average age at the time of segregation was 33·12 years, with little variation in the different races except that it was higher in Asiatics. A table of contacts with leper relations and others brings out the well-known fact that the younger generation are most frequently infected from the older or from brothers or sisters, confirming the fact that the great majority of infections take place during childhood or early adult life. A table of the first symptoms noticed among 2,153 segregated patients shows spots, patches or macules in no less than 982, nodules in 231, and redness and itching in 167. In the remaining 778 nerve symptoms first appeared, in the great majority as severe pains in the limbs, ulceration or numbness of hands or feet, in that order of frequency. It is noted that the vitally important point brought out by the tables is the long average period of about six and a half years between the appearance of the first symptom and the segregation of the patient, and this is considered to be very probably under rather than over stated, and that the true average is nearer eight years, during the early periods of which the disease is usually most infective.

The author concludes: "The lesson of all this is obvious. Until we can devise some system or method of securing *early discovery* [italics in the original] and the early institution of precautions, we cannot hope effectively to limit the spread. I am satisfied we shall never achieve this by methods of compulsion: we must secure the voluntary co-operation of the native peoples." He goes on to suggest keeping in close touch with contacts and examining them every six months or so for a period of five or six years after the removal of the original infective case from the household, and then the "spread of leprosy in the Union would very soon be checked and reduced." [This is the measure strongly advocated by the reviewer in his section on prophylaxis of Rogers and Muir's book on leprosy, page 134.] Further on he writes: "Practically all patients in institutions are now receiving active anti-leprotic treatment by various modern methods: preparations of chaulmoogra oil and its derivatives are being used with encouraging results, especially in early cases." Patients are more hopeful and are beginning to come forward in the earlier stages for voluntary admission, but much remains to be done, and it is hoped to undertake field investigations before long. Many uninfective old nerve cases have been released, as noted in earlier reports, and the progress of the South African efforts to control leprosy on modern lines will be watched with great interest. They should encourage the adoption of similar enlightened measures elsewhere.

L. R.

LABERNADIE (V.). Contribution à l'étude de la lèpre en Guyane française. [**Leprosy in French Guiana.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 306–311. [8 refs.]

——. La lèpre en Guyane française. (Deuxième mémoire).—*Ibid.* June 8. Vol. 20. No. 6. pp. 489–502. [5 refs.]

After describing the earlier very unsatisfactory conditions in this colony, the author points out that it is only since 1900 that serious studies of the disease have been made here since formerly the belief in the hereditary theory paralysed all efforts, and the conditions in the island settlement at Acarouany were extremely bad, no adequate treatment being provided. In 1922 the services of a bacteriologist were made available and a dispensary for treatment was opened in connexion with

a neighbouring Hygiene Institute. When confidence had been induced by sympathetic measures, the villages around Cayenne were visited and the number of cases under observation steadily increased from 71 in the second half of 1923 to 371 in that of 1925, and over 3,500 injections were given in the two years, mainly among villagers attending voluntarily as out-patients.

In his second paper the author records that in 1920, 83 lepers were enumerated by HENRY as living in Cayenne, but there were very few children among them, indicating the omission of many cases. From 1913 to 1925 the children have been examined in schools, and a number of early cases found. In January 1925 a total of 221 had been found, 209 of which were in blacks and mixed races, and during 1925, 90 new new cases, bringing the total to about 300, among the 12,000 inhabitants of Cayenne, or 25 per mille; a very high rate. He estimates the total numbers among the 30,000 people in the colony at 900. Cases occur not infrequently among the convicts sent to French Guiana, and with a few exceptions the disease has only developed after six or seven years' residence in the colony. In the children examined by him the disease was found from 2 years and 9 months upwards, but more frequently at the ages of five to ten years. A case is recorded of an infant separated from leper parents at the age of one month, who developed leprosy at the age of 3 years, showing very early infection, as in some recorded Philippine cases. The incubation period may thus be under three years in children. Experience shows that contagion occurs in families and from domestic servants, and that close and prolonged exposure is usually necessary. The first lesions were usually found on the face or extremities as in other countries, but the nasal mucous membrane is not infected until after the skin, and examination of the nasal mucus was never positive unless the skin lesions were also so.

L. R.

ARAUJO (H. C. de Souza). O problema da lepra. Como resolvel-o no Brasil [**Suggestions for dealing with the Problem of Leprosy in Brazil.**]—*Sciencia Med.* 1927. Apr. 30. Vol. 5. No. 4. pp. 191–197. Also in *Rev. Med. Cirurg. do Brasil.* 1927. Apr. Vol. 35. No. 4. pp. 132–139.

This article contains nothing really new. The aim in general is to establish leper-colonies and dispensaries in sufficient number. The smaller and impecunious districts might combine, with Government assistance for upkeep. For the well-to-do private sanatoria could be inaugurated on a more lavish scale. Inspectors should be appointed to find out cases in order that they might be dealt with on proper lines according as the patients were in an early stage, or non-infective, or actually a menace to others.

It is suggested that ten large colonies should be set up to take an average of 2,000 patients. These colonies should consist of small cottages to house two or four patients, and sites such as would afford horticultural or floricultural occupation.

The dispensaries would be of great use for the instruction of medical men wishing to specialize and also for the training of attendants.

H. Harold Scott.

COOL (P.). Regeerings-maatregelen ter bestrijding der lepra in Suriname en Ambon. [**Government Regulations for the Combating of Leprosy in Surinam and on Amboina.**]—*Nederl. Tijdschr. v. Geneesk.* 1927. May 7. 71st Year. 1st Half. No. 19. pp. 2453–2456. [1 ref.]

In both places leprosy is not recognized by the population as an infectious disease, and this misbelief seriously mars the Government attempts to isolate the sufferers. In Surinam these attempts have led to a fairly complete failure [see also WOLFF, this *Bulletin*, Vol. 23, p. 508], and the author is opposed to similar regulations for Amboina, where he does not expect more favourable results. If the Government decides to enforce isolation, it must be prepared to meet a good deal of opposition and take adequate measures (isolation on an island). Otherwise the combating of leprosy can only be based upon education, general sanitation and improved living conditions. The last offers great difficulties in a country like Amboina, where the sago-tree culture makes the conditions of living very easy.

W. J. Bais.

MAIRE (Georges) & PINTO (David). Contribution à l'étude de la lèpre en Syrie. [**Leprosy in Syria.**]—*Rev. Méd. et Hyg. Trop.* 1927. Mar.–Apr., & May–June. Vol. 19. Nos. 2 & 3. pp. 33–52. With 1 map in text ; pp. 65–76. [22 refs.]

This is an interesting account of the disease in an area with comparatively few cases, although it dates from Biblical times. The history of the disease is given and the ancient methods of isolation and treatment mentioned. In 1921 11 cases were met with in Aleppo, but leprosy appears to be unknown among the wandering desert Arabs. The main focus appears to be in the Lebanon Mountains among the Jebel Druse tribes, and a few scattered cases are met with in the towns and villages of other areas. Muir's E.C.C.O. mixture has been used with some benefit in nodular, but none in nerve cases.

L. R.

BREGER. Lepra in Frankreich. [**Leprosy in France.**]—*Deut. Med. Woch.* 1926. Nov. 5. Vol. 52. No. 45. pp. 1910–1911.

The writer considers the possible danger to Germany of the large number of lepers in France, and the absence of any laws for their compulsory notification and segregation or control. He quotes JEANSELME's figures showing that between 1910 and 1925 140 lepers were treated at the St. Louis hospital in Paris ; there are believed to be 200 cases in that city alone, nearly all imported from the French colonies. However, he concludes that under the favourable climatic and sanitary conditions in France, there is very little danger of infection from leprosy and, as the patients are very unlikely to visit Germany, he does not think they are any real menace to that country.

L. R.

PINEDA (Eloy V.). **Studies on Negative Lepers, I : the Persistence of the Bacilli in Deep Foci.**—*Jl. Philippine Islands Med. Assoc.* 1927. Apr. Vol. 7. No. 4. pp. 109–111.

A further study of negative lepers has been made by means of gland puncture, and by examining the tissues after death from some inter-

current disease, and the results are recorded in this paper. In fifty-three cases, which had completed their two year period as negatives prior to discharge, gland puncture of enlarged femoral lymph nodes was made with a glass syringe containing a small quantity of 1 per cent. cocaine solution, a little of which is injected before the needle is moved about to break up the gland pulp prior to applying suction. In 9, or 17 per cent., a few bacilli were found, but never in masses or globi. Eleven autopsies were done from five to seventeen months, with an average of eleven, after the patient had become negative to skin tests, and ten bodies were found to harbour acid-fast bacilli, seven times in the ulnar nerve, five times in lymph nodes and once each in the liver and spleen, three times in the testes out of eight males and once in the tonsils and prostate in three and two examinations respectively; they were especially numerous in the testes and fairly numerous in the nerves and glands. It is not considered that these findings indicate the need of change in the length of the negative period of detention, since experience shows that cases developing sufficient resistance to become negative for two years "will continue to hold the organisms in check, if not overcome them entirely."

L. R.

WADE (H. W.) & SOLIS (F.). **Studies on Negative Lepers, II: the Importance of Nasal Lesions.**—*Jl. Philippine Islands Med. Assoc.* 1927. Apr. Vol. 7. No. 4. pp. 111–115. [8 refs.]

The authors agree with the present view of leprologists that the nasal mucous membrane is very rarely the site of the primary lesion of leprosy, but they consider that such lesions are more important in the examination of patients becoming negative than has hitherto been suspected, and they record important data derived from the examination of patients reported as negative after treatment. The nasal mucosa should be actually scraped until abraded, as simple swabbing is not sufficient in non-ulcerated cases, both nostrils being examined, and they use a tiny incision with as little blood as possible in examining skin lesions for lepra bacilli. Of 600 patients examined at the request of the treating physicians in no less than 152 or 25·4 per cent. the nose was found to be positive, and they formed 44·6 per cent. of the total number found positive in some site. A further 570 patients previously found to be negative by skin tests were also examined, and 55 or 9·6 per cent. gave positive results on examining the septum of the nose, and 5·1 per cent. of all were positive in the septum alone, so that in about 5 per cent. the nose remained positive after the skin was negative. Thus, although in children the nose was never found to be infected before the skin, yet the infection may persist longer in the nose; the nose therefore should always be examined before a case is declared negative.

L. R.

WADE (H. W.) & LARA (C. B.). **Studies on Negative Lepers, III: the Problem of Relapses.**—*Jl. Philippine Islands Med. Assoc.* 1927. Apr. Vol. 7. No. 4. pp. 115–122. [8 refs.]

In the earlier treatment at Culion relapses were frequent, but they are decidedly less so with the present methods. Until recently cases becoming negative bacteriologically were kept under observation and repeatedly examined for two years before release, but now some are

paroled after six months, and report at clinics for treatment and observation. Since 1922 the negatives at Culion have been under a special committee, whose records have been analysed, when it was found that of 508 cases, 75 or practically 15 per cent., had suffered interruption, and four cases had two interruptions owing to being found positive, and two-thirds of them were still so; repeated examinations are thus necessary and it is considered advisable to increase the pre-parole periods up to nine to twelve months, since most of the relapses were found at the end of the first six months. The reappearance of infiltrations is practically always at the sites of old lesions, and since it is largely a matter of chance finding the bacilli when they have nearly disappeared "these occurrences should be considered chance interruptions and not as relapses." They will become fewer as the patients become more enthusiastic over the treatment.

L. R.

HENDERSON (John M.). **Gland Puncture Findings in Leprosy.**—*Indian Med. Gaz.* 1927. Aug. Vol. 62. No. 8. pp. 438–440. With 1 text fig. [4 refs.]

After references to former work on this line by Philippine and other workers, the author points out that none of them give accurate information regarding the type and stage of the disease in their cases. Working in the leprosy clinic of the Calcutta School of Tropical Medicine he has made gland punctures in 93 cases, only 57 of whom had been under treatment previously. He classified them according to MUIR's nomenclature into A1 and A2 for early and late nerve cases, and B1, B2 and B3 for early, second active stage and third stage, with tendency to improve, of skin cases. A2 cases were all negative, but they only numbered six. B2 and B3 were always positive and 60 per cent. of B1 were also positive. A1 cases showed 10·5 per cent. of untreated and 4·9 per cent. of treated cases positive. In slight infections the bacilli may be missed, so it is not a reliable diagnostic method. Microscopical examinations of removed glands in seven cases were all positive, including the finding of a few bacilli in one case negative on puncture a few days before. Endothelial proliferation of large ovoid cells with pale vesicular nuclei was always found, both in the vessels and the tissues, as shown in an illustration.

L. R.

BARGEHR (P.). Die Selbstheilung der Lepra. [**Natural Cure in Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 5. pp. 603–609. [1 ref.] Also in *Muench. Med. Woch.* 1926. Dec. 24. Vol. 73. No. 52. pp. 2209–2210. [1 ref.]

The author deals further with the reactions induced by the application of leprolin, made from leprous nodules, to scarified skin like tuberculin, and records the results in 162 tests. In 82 of these lepra bacilli were found in the lesions of the patients, and in all of them the leprolin reaction was negative; and of 80 showing no lepra bacilli the reaction was also negative in 45, a large proportion of whom showed definite symptoms of leprosy. Among the 35 giving positive reactions are included cases with no signs of leprosy, and those with mutilated fingers and toes, but in good general health and who had shown no change for

years, and were healed cases. Positive reactions were also obtained in men who had lived for a long time with lepers, but showed no symptoms of the disease. Negative reactions show there is no immunity to leprosy in those who have never been in contact with lepers, and in lepersin whom there is no formation of antibodies in the system.

L. R.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1927. Apr. Vol. 20. No. 6. pp. 987–1025. (Sect. of Trop. Dis. & Parasit., Dermat. & Therap. & Pharmacol. pp. 111–149). With 16 figs. [10 refs.] **Discussion on the Treatment of Leprosy.** [MACLEOD (J. M. H.), SEQUEIRA (J. H.), PERNET (George), LOW (G. C.), HENRY (T. A.), MUIR (E.), KERR (Isabel), WADE (H. W.) & LARA (C. B.), COCHRANE (Robert), TRAVERS (E. A. O.), HASSON, HALL (F.) & ROGERS (Leonard).

This important joint discussion at the Royal Society of Medicine by the Sections of Tropical Diseases and Parasitology, Dermatology, and Therapeutics and Pharmacology was arranged at the request of the Dermatological Section, which opened it. J. M. H. MacLeod reviewed the subject for the dermatologists, and dated the modern treatment of leprosy from the first leprosy international congress at Berlin in 1897, when the old hereditary theory was abandoned in favour of the contagious one. In 1909 it was declared that while leprosy is not incurable we do not possess a certain cure. He next pointed out that " Since then great advances have taken place, chiefly through the researches of my colleague at the Tropical School, Sir Leonard Rogers, and his associate, Dr. Ernest Muir in Calcutta ; Power, Dean and Macdonald in Hawaii : Denny and Brill, in the Philippines, and others." After pointing out the difficulties in estimating the value of treatment in leprosy, with illustrative cases, he discussed the general, local and specific treatment ; and included under the last class metallic preparations, sera and vaccines and vegetable oils and their derivatives, especially chaulmoogra oil ; and he mentioned the advance made when soluble salts and esters of the fatty acids suitable for injection were introduced, that of *Hydnocarpus wightiana* being now most used. During the past two years he had been using at the St. Giles' Homes for British Lepers certain of these preparations, such as chaulmoogra oil, hydnocarpus oil, E.C.C.O., sodium morrhuate, sodium gynocardate, etc., by subcutaneous and intramuscular injection, but not intravenously owing to the vein trouble that may ensue ; as the result of this experience he thinks it advisable to keep an open mind with regard to the specific action of these remedies, for while some patients held their own and improved in their general health, others were unaffected or showed only temporary benefit, and in none could a cure in the scientific sense be claimed. It was doubtful how far the arrest in some cases was due to the natural course of the disease, and treatment on general hygienic principles may help to increase the resisting powers of the patients.

J. H. Sequeira related a case apparently greatly benefited by " protein shock," which he thinks may be the real cause of the beneficial results in a number of the so-called cures. G. Pernet spoke of his experience in the treatment of leprosy in collaboration with RADCLIFFE-CROCKER and later especially with perchloride of mercury injections, which were disappointing. He thought chaulmoogra oil the best

remedy, but did not mention having used the new soluble derivatives. G. C. Low spoke of his experience with MANSON's cases and subsequently with disappointing results, including two cases treated by recent methods, but he thought protein shock might sometimes have a good effect.

The Dermatological Section speakers were followed by T. A. Henry for the Pharmacological Section, who discussed the chemical composition of the different vegetable oils used in the treatment of leprosy, first studied by POWER. He pointed out that gorli seed oil from West Africa was the only oil containing pure chaulmoogric acid, without the usual admixture of hydnocarpic acid of the other varieties ; but pure ethyl chaulmoograte made from gorli seed failed in trials in leprosy. These results, he said, are supported by early observations of L. ROGERS showing that the salts of the higher melting point fractions, mainly chaulmoogric acid, were less effective in leprosy than the lower ones containing more hydnocarpic acid, for the latter will be liquid or nearly so at the body temperature. He next spoke of a Hg33, or myristoxymercuri-*m*-hydroxybenzaldehyde, made in his laboratory, and soluble hydnocarpus oil. E. Muir had used the mixture in Calcutta by injection in syphilitic lepers with very satisfactory results.

The Tropical Disease Section's contributions to the debate were opened with a paper written by E. Muir, in which he first emphasized that we have no specific cure for leprosy in the sense of quinine in malaria and antimony in kala azar ; yet " there is a line of treatment which will cause the permanent disappearance of all active signs of the disease in early cases, so that the patient is for all practical purposes *cured*, though, if a marked reduction in his general health occurs later there is always the possibility of a relapse." Leprosy is a more remediable disease than tuberculosis, and leprosy can almost always be diagnosed clinically long before the bacilli can be found in the lesions, when the prognosis is far more favourable than in the corresponding stage of tubercle. Muir's well known lines of treatment by dealing with complicating diseases, diet, exercises, the injection of hydnocarpus oil and its derivatives, external applications and surgical measures, were next described ; the necessity of a close acquaintance with the stages and phases of the disease to allow of successful treatment and correct estimations of the value of drugs was emphasized. The fallacies due to limited experience and to the subsidence of acute phases independent of treatment being attributed to drugs were pointed out. His present routine treatment is the intramuscular or subcutaneous injection of 4 cc. gradually increased to 10 cc. of hydnocarpus oil containing 4 per cent. of creosote ; and when the full dose is reached without local or focal reactions, 1 per cent. sodium hydnocarpate in doses rising from 2 to 10 cc. is given intravenously, the oil being returned to when a reaction is obtained or the veins become blocked ; an alternation of the two methods is best. The drugs may be pushed safely to cause reactions in the first and third stages, but caution is necessary in the active second stage to avoid dangerously severe reactions with spread of the lesions. Considerable experience, such as is only obtainable in the endemic areas, is therefore essential to enable the best results to be obtained. For the severe pain of nerve cases intramuscular injection of 3 or 4 minims of 1 in 1,000 adrenalin chloride is of value, and greatly thickened nerves may be benefited by incision and freeing the nerve from the surrounding tissues. Repeated negative bacteriological examinations, and disappearance of all erythema from

the macules, with absence of change in the anaesthesia for six months, are the criteria of the disappearance of all active signs; after which treatment may be stopped and the patient watched for two years. A table is given of 64 cases remaining free from all active signs for one to five years, 36 of whom have been well for three to five years; and it is stated that if all those treated could have been followed up the number would have been four or five times as large, indicating lasting results.

He concludes that in spite of the absence of a certain specific cure "by carrying out treatment along the lines indicated above we can hope for a permanent disappearance of all active signs in almost all patients in whom the disease is recognized early. While in the later stages, although much more prolonged treatment is necessary, very promising results are obtained and many have become entirely better and have remained so for periods of several years." It follows that the treatment of many early cases at clinics, as in Calcutta and many other places in India, "is cutting off to a large extent the bacillary reservoirs which would have served to infect the next generation . . . I think we already have in our hands a line of treatment which will aid the rapid disappearance of leprosy from India and from the world, though delay is inevitable, due to the ignorance and backwardness of certain classes of the community."

Sixteen striking photos before and after treatment in different stages are given, which leave no possible doubt of its value in experienced hands.

The next paper by H. W. Wade and C.B. Lara, Chief Pathologist and Chief Physician to the Culion Leper Colony in the Philippines, was communicated and read by L. Rogers, and dealt with the results of the modern treatment in nearly 6,000 cases at Culion and nearly 3,000 at Manila, so is of the greatest importance. After defining a leper they record that the first favourable results of the Mercado mixture intramuscularly, reported by V. G. Heiser, were not altogether confirmed by later experience, as most of the 24 patients who became negative under it apparently relapsed, for only four treated cases were released in 1913 after being negative for two years; the treatment was decidedly heroic. After the introduction of the ethyl ester chaulmoogrates intramuscularly they have been used very extensively, advanced cases averaging 8 years in duration being treated at Culion, and earlier ones at the San Lazaro Hospital at Manila; the number discharged from the later on parole as negative averaged 50 a year during the last five years, and reached 150 in 1925; while 76 more were parolled in the last three years at the small Cebu detention camp. Among the advanced Culion cases by the beginning of November, 1926, 629 negative cases had been obtained, or about 10·5 per cent. of those treated, which all the releases to the end of 1926 will bring up to 800. Moreover, relapses have been few, and are becoming still less frequent with increased experience. From 1913 to 1921, 88 cases were discharged, and between 1922 and 1926 634, but the former only after being negative for two years, so the figures are not quite comparable.

The authors conclude that the ethyl esters are certainly more effective than the Mercado mixture, and "the modern treatment methods are decidedly superior to the older ones, and seem to be particularly effective in early cases. Though they are admittedly much less effective in well-established advanced cases, the results obtained in the Philippine Islands during the last few years show that a not inconsiderable proportion of such cases (probably 15 to 20 per cent.) can be 'apparently cured' if treated intensively, under proper conditions. This is a noteworthy advance, however discouraging to anyone treating any particular small group of

unselected cases. In view of the impressive total, which all 1926 releases will bring to 800 or more, one cannot, we submit, deny the relative effectiveness of present treatment, or its absolute value in properly selected cases. It were quite as correct to deny the value of surgery in cancer. In leprosy, as in cancer, emphasis must be laid on getting the patient early. It is from this point of view that treatment is now revolutionizing anti-leprosy campaign systems."

Isabel Kerr contributed the third paper of the Tropical Diseases Section on the results obtained at the model Dichpali Institution, India; she recorded 17 and 19 per cent. respectively of cases becoming quite negative after treatment in two series of cases each spread over two years, no case that could possibly benefit being refused treatment, and she concluded that "most cases of early leprosy do well, and one can count on a large percentage of successes." She also agrees with Muir that third stage cases improve rapidly, and that with protracted careful treatment second stage cases also improve, 45 to 47 per cent. having been "very much improved" in addition to the recoveries; no less than 63 per cent. of the bacteriologically positive infective cases became non-infective under the treatment. This must result in greatly fewer new cases in the near future.

Robert Cochrane, as the result of a prolonged tour in the East, studying over 10,000 cases, was in agreement with the statements of E. Muir, for of the various treatments he had seen, Muir's creosoted hydnocarpus oil was both the cheapest and most effective remedy. Of 20 cases the speaker had discharged as recovered, none had relapsed eighteen months after the discharge of the last, and all were working as ordinary folk. E. A. O. Travers advocated once more the Chinese treatment with powdered *Hydnocarpus anthelmintica* nut, given orally with a small portion of cannabis indica; by which simple means he had obtained 11·5 per cent. of negative cases at the Kuala Lumpur leprosy institution in the Federated Malay States. The daily doses could be given out to 350 lepers in half an hour. Hasson in a few words reiterated his opinion that his "vaccine was absolutely specific"; the only such claim made in the debate. F. Hall from his experience in charge of the Leper Asylum in Fiji considered that there was no specific treatment for leprosy, and that all treatments producing sensitization or reaction are harmful.

L. Rogers replied for the Tropical Diseases Section, and pointed out that MacLeod's cases, as reported in the tables he showed, were nearly all residual resistant advanced cases in which various treatments had previously been tried without effect; so they were the most unsuitable cases for trial, any want of success being thus explained. The case recently reported by Graham LITTLE as cured by Hasson's vaccine was a temporary exacerbation in a partially immune third stage one, which Muir has shown clears up by itself; so it affords no evidence of the value of the treatment; while Muir had just written to say that he had tried the vaccine sent him by Hasson in a favourable case with complete failure. Rogers then summarized the results recorded in the papers submitted in the Tropical Diseases Section papers, and some other recent trials, in the following table, and he pointed out that the data brought out the facts that in advanced cases only 10 to 20 per cent. became bacteriologically negative. In earlier ones treated at the Kalihi hospital at Honolulu, and at the clinics of MUIR and himself at Calcutta for six months or more, 30 to 40 per cent. were apparently cured; the highest rate being 41 per cent. in the only series treated by

the soluble sodium salts of the chaulmoogra series of fatty acids intravenously by the speaker. This method had been little used since his early work, on account of the blocking of the veins it often induced; but G. A. PERKINS, the Culion expert chemist, had recently stated that it is the most active method, by which effective treatment was first obtained in a large group of cases; the gradual obstruction of the veins appeared to be the main reason against its extensive use at the present time. The speaker was glad to be able to announce that this difficulty

TABLE OF CASES TREATED WITH INJECTIONS OF CHAULMOOGRA OIL DERIVATIVES.

Place and Observer.	Years.	Cases.	Apparently cured.	Per cent. cured.	Much improved, per cent.	Improved, per cent.	Not improved.	Remarks.
Manila ... (H. W. WADE)	1921–5	(2,990)	356	—	—	—	—	(1,511 sent to Culion.) Average duration, 2·65 years.
Culion ... (C. B. LARA)	1921–6	6,000	629[1]	10·5	—	—	—	(Average duration, 8 years.)
Honolulu ... (*U.S. Report*)	1920–4	394	124	31·47	—	—	—	Paroled, only 13 relapsed, of whom 7 had not continued treatment after parole.
Calcutta ... (E. MUIR)	—	203	43	21·18	—	—	—	Cases treated, 3 months or more.
		123	38	31·0	—	—	—	Cases treated, 6 months or more.
Dichpali ... (I. KERR)	1923–4	180	30	17·0	45·0	35·0	3·0	63 per cent. became uninfective.
	1925–6	?	—	19·0	—	—	—	Discharged, improved.
Japan ... (K. SHIGA)	1921–3	211	23	10·9	14·2	—	—	+
Siam ... ... (O'BRIEN)	2 years	357	—	—	21·7	48·6	29·6	Duration, 1 to 3 years.
					23·3	49·4	28·2	Duration, +3 years.
New Caledonia (GENEVRAY)	—	70	6	8·75	31·4[2]	11·4	48·6	90 per cent. improved. After 18 months only 5 relapsed.
Korea ... (R. W. WILSON)	—	—	75	—	—	—	—	
Calcutta ... (L. ROGERS)	1915–19	51	21	41·2	39·2	17·6	2·0	Na hydnocarpate intravenously.

[1] By end of 1926 the apparently cured would exceed 800.
[2] 17·14 classed as "nearly cured."

had at last been overcome, as an unirritating hydnocarpate of soda had been prepared for him by T. A. HENRY, which was painless on subcutaneous and intramuscular injection in the usual 3 per cent. solution, and also nearly unirritating to the veins in a 1 per cent. solution, but quite effective by all three methods; much more so than the ethyl esters in his limited recent experience, while MUIR had now adopted it as part of his routine treatment. It had a further great advantage of

rapid absorption, and, still more important in the tropics, its cost per dose worked out at about one-twentieth of that of a good ethyl ester. Large amounts had been sent out for trial, and if his experience was confirmed an important practical advance would result. [Since this discussion MUIR has written to the reviewer to say that all vein trouble can be avoided, even with a 2 per cent. sodium hydnocarpate solution, by the simple expedient of drawing up about as much blood as the dose, rotating the syringe on its long axis to mix, and injecting the whole; up to 7 cc. having been given thus with only slight temporary giddiness.]

L. R.

HOFFMANN (W. H.). Die Goldbehandlung der Lepra. [**Gold Treatment of Leprosy.**] —*Muench. Med. Woch.* 1927. Mar. 11. Vol. 74. No. 10. pp. 405–406.

This paper deals with the use of Krysolgan in leprosy, and comes to a similar conclusion regarding its special value in the serious eye lesions of the disease, as in tuberculosis. The author reports that in a number of lepers with eye complications he obtained complete resolution of the signs of irritation, and he has no doubt as to its value, for benefit may result after even one or two injections; photophobia also disappeared and all pain ceased, together with the fear of going blind. The drug is made by E. Schering of Berlin, and is easy to use. He thinks a larger experience is necessary before coming to a final conclusion of its value.

L. R.

KUPFFER (A.). Ueber die Behandlung der Lepra mit Krysolgan. [**Treatment of Leprosy with Krysolgan.**]—*Med. Klin.* 1927. Mar. 11. Vol. 23. No. 10 (1161). pp. 364–365.

Krysolgan acts mainly on the eye lesions of lepers and also produces general improvement. It is given as in tuberculosis, the doses beginning with 0·001 gm. and gradually increased up to from 0·01 to 0·02 gm. injected every fourteenth day at first, and later every eighth day, with occasional intervals of a few weeks. Reactions occur as in tuberculosis, but are not so severe. In some macular cases there is numbness for a few hours. No local reaction occurs, except after two to seven days in the lesions, very slight in macules, and lasting two or three days in the form of increased redness, especially at the margins. In nodules swelling takes place, and in healthy parts of the skin papules or erythema with heat and redness and even vesicles may appear. The most important results are lessening of any inflammatory affection of the eyes with decreased pain and photophobia; episcleritis may disappear and cloudiness of the cornea resolve, lepromata gradually disappear and the pupils become clear again with improved vision. Lesions of the skin and mucous membranes may also improve, and one patient regained his voice; skin ulcers healed.

L. R.

PALDROCK (A.) & RÄNGEL (A.). Zur Sanokrysinbehandlung der Lepra. *Dermat. Woch.* 1927. Mar. 12. Vol. 84. No. 11. pp. 372–374.

—— & ——. **Sanocrysin Treatment of Leprosy.**—*Amer. Jl. Trop. Med.* 1927. July. Vol. 7. No. 4. pp. 241–245. [Univ. Skin Polyclinic, Tartu, Esthonia.]

Three cases of nodular leprosy have been treated by sanocrysin in total quantities of 4·5, 5 and 6 grams intravenously. Fever and general reactions were produced with headache, nausea, vomiting, palpitation and weariness, followed soon after by skin reactions. Before and at monthly intervals during the treatment lipase estimations were made, but no significant increase was produced. "The Sanocrysin treatment did not cause the disappearance of nodules nor did it modify their appearance. It showed no curative effect, though it caused a rise of temperature and general and cutaneous reactions."

L. R.

RANGEL (Doutorando Mario). O tratamento da lepra pelo "Antileprol." [**The Treatment of Leprosy by "Antileprol."**]—*Rev. Med. Cirurg. do Brasil.* 1927. Feb. Vol. 35. No. 2. pp. 43–45.

Good results have been obtained at the São Sebastião Hospital by intramuscular injections of Antileprol every two days, but for the last year the intravenous route has been employed and is recommended for the following reasons: (1) It is free from risk; the fear of emboli from injecting an oily substance into the veins has proved groundless. (2) Pain and local reaction are avoided. (3) The amount introduced into the system can be accurately determined, whereas with intramuscular injection an uncertain proportion may remain unabsorbed.

More detailed account of the results will be published when this method has been employed for a longer period.

H. Harold Scott.

TREUHERZ (Walter). 4 Jahre Erfahrungen mit intravenösen Injektionen von Antileprol (Bayer), kombiniert mit 2% iger Brechweinsteinlösung intravenös gegen Lepra. Eine Studie. [**Four Years' Experience of Antileprol and Tartar Emetic intravenously in Leprosy.**]—*Dermat. Woch.* 1927. Mar. 19. Vol. 84. No. 12. pp. 394–404.

The author has found that from 0·1 to 0·3 cc. of antileprol can be injected intravenously without symptoms; in girls of 16 to 20 years of age 0·4 cc. produce coughing, and larger doses cause dyspnoea and other distressing symptoms; in males over 40 from 0·8 to 1·2 cc. can be injected every other day without serious trouble and with good effects. This may be alternated with 2 to 3 cc. of a 2 per cent. solution of tartar emetic, each being injected intravenously every fourth day. The effects are seen not in a change in the skin lesions or in general improvement, but are due to a change in the lepra bacilli producing greater resisting powers with longer intervals between the naturally occurring exacerbations of the disease. Good results were obtained in macular cases.

L. R.

HOFFMANN (W. H.). Die Behandlung der Lepra mit Antimon. [**Treatment of Leprosy with Antimony.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Mar. Vol. 31. No. 3. pp. 139–141.

The author states that we now have a simple and reliable treatment for controlling leprosy, the chaulmoogra oil preparations being specific. He finds antimony is also a useful drug in combination with the chaulmoogra preparations, the two attacking the disease from different sides ; and he has used for this purpose von Heyden stibenyl, antimosan and stibosan intravenously. He thinks, however, that the chaulmoogra ethyl esters are the more active remedy.

L. R.

DE NOVAES E SILVA (Severino). Tuberculinotherapia da lepra pela T.O.A. do Instituto Oswaldo Cruz. Experiencias clinicas feitas. [**Treatment of Leprosy by Tuberculin T.O.A.**]—*Rev. Med.-Cirurg. do Brasil.* 1927. Mar. Vol. 35. No. 3. pp. 83–98. With 3 charts.

Brief records are given of three cases of leprosy, of the mixed form, treated by tuberculin.

(1) A man, 28 years of age, in whom the disease had existed for 11 years. He had been treated by chaulmoogra (nature not stated), by Antilebrine and by 58 injections of Antileprol intravenously. All treatment was suspended for 25 days prior to starting T.O.A. Injections were given intramuscularly once a week. 1 cc. of the "sixth dilution" was the initial dose and was well borne. The second caused drowsiness and a rise of temperature. With later injections the nasal discharge improved and some of the nodules cicatrized, but the maculae were unaltered. These, however, began to clear with the "fourteenth dilution" and after the nineteenth they diminished in size and the sense of touch and pain began to return. (2) A man of 41 years had had the disease for 6 years, for which he had received chaulmoogra oil by mouth and later 36 doses by injection. After 40 days' interval T.O.A. was begun. The first injection of sixth dilution produced focal and general reaction. After the eighth dilution the nasal discharge ceased and adherent crusts formed. After the ninth, the nodules diminished in size, and after the fifteenth the maculae began to react. (3) A man of 33 years, a leper for 12 years, general condition good ; had had one injection of chaulmoogra oil and one series of Antilebrine, with slight improvement. T.O.A. was started after an interval of 10 days. After the first dose there was a focal reaction with an increase of the nasal secretion and drowsiness. Some improvement followed later injections, but the reaction became virulent and treatment was suspended after 3½ months.

The results showed that leprous patients react to tuberculin, and that both nodular and macular forms are benefited. [Unfortunately we can find no indications as to the constitution of the dilutions referred to, except that the higher numbers appear to indicate greater concentration.]

H. Harold Scott.

OSAWA (Y.). & NOJIMA (T.). Sympathektomie an Leprakranken. [**Sympathectomy in Leprosy.**]—*Deut. Med. Woch.* 1927. Jan. 7. Vol. 53. No. 2. pp. 65–67. With 2 text figs. [11 refs.]

Operations for removal of the cervical sympathetic nerves in cases of ulnar leprosy, and of the periarterial sympathetic nerves of the femoral

arteries in cases of nerve leprosy of the lower extremity are reported, one of the femoral operations having been followed by septic infection and death from secondary haemorrhage. It is claimed that healing of ulcers was promoted by the operation, an ulcer of a finger of five months' duration healing in five weeks, and perforating ulcers of the foot of four and six months' duration healing in ten to fourteen days. Absorption of infiltrations both of the skin and of nerves may also be marked, and discolouration of the skin may improve, as well as ulnar neuralgia; but there was no recovery of sensation.

L. R.

TISSEUIL (J.). O tratamento da lepra pela ionisação. [**The Treatment of Leprosy by Ionization.**]—*Rev. Med.-Cirurg. do Brasil.* 1927. May. Vol. 35. No. 5. pp. 185–191.

Rats with rat-leprosy from infection with *B. pulviformis* were treated with various metals by ionic medication. The results were far from satisfactory. With silver salts the lesion increased in size and the condition was aggravated; with copper salts, after an initial increase, a diminution occurred, but this beneficial effect was not maintained and extensive ulceration developed. Gold salts caused marked and progressive increase in the size of the lesions as compared with the controls.

[Had the results been favourable, it would not necessarily follow that human lepers would react in the same way.]

H. Harold Scott.

BARGEHR (P.). Das Blutbild bei Lepra. [**The Blood Picture in Leprosy.**]—*Arch. f. Dermat. & Syph.* 1926. Vol. 152. No. 2. pp. 462–464.

The examination of the blood in 130 lepers showed that the erythrocytes were little changed, the blood platelets were numerous; and the basophile leucocytes numbered up to 0·2 per cent. The differential leucocyte count showed that the eosinophiles varied between a few and 60 per cent., being frequently up to 25 per cent. or more, but in 6 per cent. they were below normal. The neutrophiles were normal in slight cases; myelocytes were rare and the monocytes were about normal. The changes were not of much diagnostic value.

L. R.

PAIS (Luigi). Sierologia nella lepra. Nota la. [**Serum-Reactions in Leprosy.**]—*Giorn. Ital. di Dermat. e Sifil.* 1927. Feb. Year 62. Vol. 68. No. 1. pp. 84–108. [28 refs.]

The author carried out various serological examinations with the blood of 29 leprous patients, of whom 11 were of the nodular type, 3 anaesthetic, 13 mixed, and 2 in the very early stage (children of a leprous mother and living with her). The sera were examined by the Wassermann reaction, Jacobsthal's cold-fixation method, the Sachs-Georgi, Meinicke's flocculation and Bruck's and, lastly, Meinicke's turbidity reaction.

For lepra antigen small nodules were macerated in 95 per cent. alcohol for 3 days at room-temperature and the filtrate employed. For syphilitic antigen an alcoholic extract of guineapig's heart was used; for the Sachs-Georgi method cholesterinized ox-heart.

Of the 24 cases of nodular and mixed forms 10 sera had an anticomplementary action in greater or less degree. The author ascribes this, in part at least, to the chaulmoogra oil used in treatment, because it was greater in those actually undergoing treatment, but did not occur in those who had ceased treatment some time previously. Anaesthetic patients' sera gave complete haemolysis. By the Jacobsthal method 5 out of 11 cases gave a positive result with lepra antigen.

Of the flocculation methods, the Meinicke test (D M R) proved negative in all; by the Sachs-Georgi 18 per cent. were positive; these and all the positive results with the Bruck test are regarded by the author as autotropic, on account of the anticomplementary-autoflocculation action of the serum. Lastly, the Meinicke turbidity reaction proved, like the D M R, negative in all. The results of the individual tests are presented in tabular form.

H. Harold Scott.

VILANOVA (Xavier) & CATASÚS (J. M.). Estudios sobre lepra. (la Nota). Serología. [**Studies on Leprosy. Note 1. Serological.**]—*Rev. Méd. Barcelona.* 1927. June. Year 4. Vol. 7. No. 42. pp. 592–597. [53 refs.] ["Instituto Profiláctico" Barcelona.]

The authors regard the following facts as established: (1) The serum of leprous patients possesses the power of fixing complement in the presence of various antigens; (2) the discordant results recorded by different investigators are due largely to the varying techniques employed; (3) the positive results are not affected by antisyphilitic treatment nor by the drugs regarded as specific for leprosy; (4) Nodular leprosy gives a higher percentage of positive results than the anaesthetic or nervous types; (5) Eitner's reaction is not specific.

The authors themselves investigated sera from 23 patients, 16 of the nodular form, 4 of the mixed, and 3 of the nervous, by the methods of Wassermann, Jacobsthal, Hecht, Meinicke, and Vernes. With the two first, 9 of the nodular and 3 of the mixed proved positive, all the purely nervous negative. Meinicke gave constantly negative results in all. The Vernes reaction, carried out strictly in accordance with the originator's instructions, gave very high figures. These facts are presented in tabular form.

The moral to be drawn is that the close analogies revealed between the results of some of the tests by leprous and syphilitic sera may lead to error if the diagnosis be based on one of these tests only.

H. Harold Scott.

SAKURAI (H.). Pri l'Seroreakcio kaj Fermentoreakcio de Lepro. [**Serum and Ferment Reactions in Leprosy.**]—*Japan Jl. Dermat. & Urol.* 1926. Apr. Vol. 26. No. 4. Esperanto summary pp. 9–10. [In Japanese pp. 281–306. 14 refs.]

The writer has tested the several forms of Wassermann reactions in 139 nodular and 49 nerve lepers, and found the percentage positive varied from 18·5 per cent. with the Sachs-Georgi method, through 42·8 per cent. with Wassermann test with ER. Lecithin, to 96 per cent. with Kolin R. in nodular cases; and from 10 to 96 per cent. in nerve types; but leprosy cases reacted very irregularly with different tests, while syphilitic sera gave much more uniform results. The ferment test of NOJIMA proved not to be specific for leprosy.

L. R.

GOMES (J. M.). Desvio do complemento na lepra com o Streptothrix leproide de Deycke desengordurado. [**Complement Deviation in Leprosy with Defatted Streptothrix Leproides Deycke.**]—*Rev. Biologia e Hyg.* São Paulo. 1927. Vol. 1. No. 1. pp. 17–36. English summary pp. 37–38. [10 refs.]

This work is on the lines of that of TAYLOR and MALONE on complement fixation with fat-free tubercle bacilli. The Deycke organism was defatted by McJunkin's method with olive oil and acetone, and it is claimed that 82·29 per cent. of lepers sera gave positive reactions, and other skin diseases gave negative ones.

L. R.

DUNSCOMBE (W. K.). **The Serum-Formalin Reaction in Some Cases of Leprosy.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 512–513. [1 ref.]

Tests in 38 cases, including all stages of treated and untreated cases, showed great variations in the reaction, so that contrary to the opinion of DYE [see this *Bulletin*, Vol. 23, p. 894], the test is not reliable for diagnostic and prognostic purposes.

L. R.

CALATRONI (R.). Vérification de la valeur d'une nouvelle méthode pour le diagnostic de la lèpre. [**Value of a New Method for Diagnosis of Leprosy.**]—*C.R. Soc. Biol.* 1927. July 1. Vol. 97. No. 21. pp. 264–265.

In the complement fixation method tested the red corpuscles of the patient were used in the place of the serum, and the serum of a rabbit prepared with the red cells of subjects attacked, a positive reaction consisting in the production of haemolysis, instead of the reverse with the Wassermann test. As the results were entirely negative in leprosy the details of the test do not require to be described.

L. R.

PALDROCK (A.). Zur Chemie des Lepraerregers. 4. Mitteilung. [**Chemistry of the Lepra Bacillus.**]—*Dermat. Woch.* 1927. Feb. 26. Vol. 84. No. 9. pp. 289–292.

This paper deals with the chemical reaction of the various acid-fast bacilli cultivated by a number of workers from leprosy cases, including those of CLEGG, ELLY, BARRY, NABARRO-BAYON, BRINKENHOFF and of CURI and REENSTIERNA, and also with lepra nodules containing undoubted lepra bacilli. He argues that as the reactions were the same with both classes of material, his results support the view that these various bacilli are true lepra organisms, especially as those of tubercle bacilli show some differences. Methylene blue, methylene green and violet blue stains were used after the organisms had been treated with various chemicals, including normal saline, 3 per cent. sodium acetate for 24 hours, 25 per cent. hydrochloric acid, and 24 hours in 10 per cent. nitric acid, producing varying degrees of hydrolysis. To remove the lipoids three days in ether renewed daily, to remove the lipo-proteids two days in 10 per cent. nitric acid and alcohol were used, and after every process the staining reaction of both classes of material remained the same, indicating similarity of chemical composition.

L. R.

PALDROCK (A.). Das mikrochemische Verhalten der Lepraerreger und der Tuberkelbazillen. [**The Micro-chemical Behaviour of the Leprosy and Tubercle Bacilli.**]—*Dermat. Woch.* 1927. Apr. 9. Vol. 84. No. 15. pp. 487–491.

In this paper the chemical reactions of tubercle and lepra bacilli are compared, with the conclusion that both contain nucleo-, karvo-, lipo- and plasteo-proteids, together with free nucleic acid and lipase. Plasteo-proteid is more firmly combined to lepra than to tubercle bacilli. The chemical difference accounts for the different actions of the same drugs on the organisms of the two diseases.

L. R.

PARÁS (Ernesto M.). **Blood-Chemistry Studies in Leprosy. II. The Alkali Reserve.**—*Philippine Jl. Sci.* 1927. June. Vol. 33. No. 2. pp. 155–167. [12 refs.]

These observations were undertaken on account of the Culion physicians findings alkaline treatment of benefit in cases of lepra reaction. Van Slyke's method of determining the alkali reserve was used, the carbon dioxide capacity being determined in 12 healthy blood plasmas, and in 110 cases of leprosy with and without lepra reactions. No significant changes were found in uncomplicated cases of leprosy, and most cases during lepra reactions also gave normal results, but the alkali reserve was reduced in cases complicated by nephritis. No relation to the type, progress or treatment of leprosy was found.

L. R.

SOLIS (Filiberto). **A Report of an Unidentified Microorganism isolated from Cases of Acute Vegetative Endocarditis among Lepers in Culion. With Brief Mention of Clinical Aspects.**—*Jl. Philippine Islands Med. Assoc.* 1927. May. Vol. 7. No. 5. pp. 155–159. [2 refs.]

Out of 606 autopsies at Culion in two and a half years, 27 showed acute bacterial lesions of the valves of the heart, the organism found in 17 being *Streptococcus haemolyticus* in 2, *Staphylococcus aureus* in 3, and an unidentified organism in 12. In no case was there any previous infection. Fever, sweating and leucocytosis were present, with nausea or vomiting and prostration, death usually occurring in two or three weeks. A short, plump, non-motile bacillus was found, the cultural characters of which are given in detail. The blood of cases agglutinated this bacillus to 1 in 160, but the blood of other lepers only in a 1 in 10 dilution. It was not pathogenic to any laboratory animal. The organism is considered to belong to the genus *Hemophilus* of the family of Hemophilae of American bacteriologists.

L. R.

ARAUJO (H. C. de Souza). O problema da lepra. Necessidade d'uma co-operação internacional.—*Sciencia Med.* 1927. Mar. 31. Vol. 5. No. 3. pp. 154–158.

CROCCO (G.) & LOTTICO (S.). Due casi di lebbra a forma mutilante.—*Riforma Med.* 1927. May 2. Vol. 43. No. 18. pp. 428–429.

LEGER (Marcel). Remarques sur la lèpre à la Guyane française.—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 311–314.

CHOLERA.

RUSSELL (A. J. H.) & SUNDARARAJAN (E. R.). **Forecasting of Cholera Epidemics.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 901–932. With 16 graphs. [9 refs.]

This is a statistical paper with tables and numerous graphs apparently founded on recent work by BUNDESEN and HEDRICH on early detection of epidemic trends (*Amer. Jl. Pub. Health.*, 1925, Apr.). Their work refers mainly to scarlet fever, measles and whooping cough and among other conclusions they point out that the current calculations and charting of epidemic indices can be done with very little labour from data furnished weekly in Public Health Reports. Russell and Sundararajan conclude that cholera has a downward trend in some areas in India and an upward trend in others for the period of years examined. The most suitable "standard of comparison" for the current data of cholera deaths is the median values of the corresponding months or weeks of the preceding decade. By means of the epidemic index it is possible to forecast epidemics two to three months ahead of their actual occurrence and epidemic index graphs give a very clear picture of the movements of epidemics. By the use of these graphs watch can be kept for possible outbreaks of cholera and preventive measures can be intensified. [v. this *Bulletin, ante*, p. 41 (ROGERS), Vol. 22, p. 765 (Russell etc.)]

J. H. Tull Walsh.

GRAHAM (J. D.). Etudes sur le choléra et expériences de vaccination anticholérique dans l'Inde Britannique. [**Studies in Cholera and Anti-Cholera Vaccination in India.**]—*Bull. Office Internat. d' Hyg. Publique.* 1927. May. Vol. 19. No. 5. pp. 613–623. [2 refs.]

This is a resumé of work done and reports on various aspects of cholera in India, presented to the "Office International d'Hygiène Publique" by the Sanitary Commissioner with the Government of India. Most of the subjects referred to have already been noticed in this *Bulletin*. Tables are given showing certain results of oral vaccination with bile-vaccine and also with ordinary anti-cholera vaccine by the subcutaneous method. For oral vaccination the figures are not sufficient for certain conclusions. The laboratory results of experiments with bile-vaccine on rabbits are most unsatisfactory. On the other hand the advantages of subcutaneous vaccination, as shown by the statistics given, are very evident.

J. H. T. W.

YUNG TSU (T.). Anscheinende Cholerainfektion durch Krabbengenuss. [**Apparent Cholera Infection by Crabs.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Aug. Vol. 31. No. 8. p. 391.

The author describes a case of a student in Shanghai who was attacked with cholera, after eating five uncooked crabs, with the usual symptoms. In a hanging drop from the stools numerous cholera vibrios were seen. Cholera was prevalent at the time.

J. H. T. W.

SATA (A.). Ein Fall typischer Laboratoriumsinfektion von Cholera asiatica. [**Case of Laboratory Cholera.**]—*Deut. Med. Woch.* 1927. June 17. Vol. 53. No. 25. p. 1052. [2 refs.]

Describes the case of Dr. MATSUSAKI who had been working upon cholera vibrios for some time and was suddenly attacked by typical symptoms of cholera, with distinct " rice-water " stools, and vomiting which lasted three days. On the third day the patient was better and on the way to recovery. He was treated with intravenous injections of saline solution and grape sugar. Digitalin and camphor were also given to support the heart. Cholera vibrios were found in the stools.

J. H. T. W.

CANNON (Alexander). **A New Era in the Treatment of Cholera.**—*Caduceus Jl. Hongkong Univ.* 1927. Mar. Vol. 6. No. 1. pp. 34–43. [5 refs.]

This is a general paper on the history of cholera, its pathology, prevention and treatment. Presumably the title refers to treatment with the " essential oils mixture." The author writes : " There is reason to believe that this treatment saved both Shameen and Canton from a severe epidemic of cholera." [*ante*, pp. 462–463 (BHARATI, CANNON, TOMB)].

J. H. T. W.

SEALY (G. O. F.). **The Essential Oil Treatment of Cholera.** [Correspondence.]—*Brit. Med. Jl.* 1927. May 28. p. 985.

The author writes to question the matter of priority for the essential oils in the treatment of cholera. He claims that he described the method for the first time in a paper published June 10th, 1922 [no reference]. He admits, what is well known, that the formula was found on the Government's " Pro-diarrhoea mixture " as supplied from store for the past thirty or forty years. [We do not gather from Dr. TOMB's article (this *Bulletin*, Vol. 20, p. 736) that any claim was made for originality or priority.]

J. H. T. W.

i. TOMB (J. Walker) & THOMPSON (G. W.). **A Critical Enquiry into the Rationale of Intravenous Hypertonic Saline Injections in the Treatment of Cholera.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 516–521. [4 refs.]

ii. ROGERS (Leonard). **A Note on Certain Criticisms of Hypertonic Salines in the Treatment of Cholera.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 522–523. [1 ref.]

i. From ten years' observation of the results of treatment by various methods of thousands of cases of cholera in the coalfields of Bengal and Bihar and Orissa, the writers have been forced to the conclusion, contrary to their previous belief, that the treatment of cholera by intravenous hypertonic saline injections presents, in practice, no superiority over treatment of the disease by ordinary carminative " cholera mixture " containing, as a rule, some preparation of opium—the mortality rate being approximately 50 per cent. in both cases. Hypertonic salines are, moreover, no longer rigidly adhered to ; formulae for hypertonic, isotonic saline and isotonic and hypotonic alkaline salines as used in the Campbell Hospital, Calcutta, are given. ROGERS' practice, founded on reasoning set out in " Cholera and its Treatment "

(1911), is freely criticized and the authors consider, from the examination of chlorides of "seven fatal cases" (average 0·79, *l.c.* p. 148), that, if we take the salt content of the blood as a guide to the salt content of the tissues, then from Table X (*l.c.* p. 143) we find that not only is the percentage of salts in the blood not lowered in cholera but—as might be expected from the loss of so much hypotonic fluid—that it is increased (0·92 the average of 5 cases, not requiring transfusion, as compared with a normal of 0·8 per cent.). They further deny that hypertonic saline checks flux from the bowel and maintains the blood pressure unless repeated injections of this or isotonic saline are given; and state that hypertonic salines possess no specific action in cholera being purely symptomatic to replace, as frequently as may be necessary the fluid lost from the bowel. They refer to figures given by ROGERS ("Bowel Diseases in the Tropics" 1921) showing that the mortality in 589 cases treated by potassium permanganate pills was lower than that of 294 cases treated by hypertonic salines. The teaching of ROGERS that opium is contraindicated in the early stages of cholera is considered to be harmful and erroneous, particularly where paraphernalia for saline injections are not available.

ii. Sir Leonard Rogers considers the attack made upon the facts supporting his theories to be based on a fallacious comparison since it contrasts a mortality of 32·6 per cent. which occurred under hypertonic salines before the method was fully worked out and in a very serious class of cases, admitted to the Calcutta Medical College Hospital, with that in the villages of the coal fields and, in the cases of permanganate data, in Bombay villages. Most village outbreaks contain more mild cases than does a hospital series. *The true comparison is between the same class of cases in the same hospital before and after the introduction of the hypertonic salines,* as given in the following table:—

Period.	Treatment.	Cases.	Deaths.	Mortality (per cent.)
1895–1905	Rectal and subcutaneous salines	1,243	783	59·0
1908–1909	Hypertonic intravenous salines	294	96	32·6
1910–1914	Hypertonic plus permanganates	858	122	25·9
1915–1919	Hypertonic plus permanganates plus alkalies	1,429	298	20·8

Reduction of mortality by hypertonic salines alone ... ... 45 per cent.
Reduction of mortality by hypertonic salines *plus* permanganates 56 per cent.
Reduction of mortality by hypertonic salines *plus* permanganates *plus* alkalies ... ... 65 per cent.

The efficiency of saline injections has been confirmed by extensive experience in the Campbell Hospital, in China and elsewhere. He has always recognized that to produce the best results these cases require skilled and constant attendance possible only in hospital; but this does not alter the value of the full treatment under proper conditions. [v. this *Bulletin*, Vol. 24, p. 461 (BERCOVITZ); p. 462 (LIEO); Vol. 23, p. 613 (YUI); also index of previous vols. for numerous references.]

J. H. T. W.

GOUBIN (V.). Sur les formes microbiennes spirillaires du sol par rapport à l'épidémiologie du cholera. [**Soil Spirilla and the Epidemiology of Cholera.**]—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 1. French summary p. 134. In Russian pp. 90–95. [8 refs.]

An important point in the epidemiology of cholera is the frequency of occurrence of spirilla in different soils. Eighteen samples of soil were examined by culture on synthetic media and spirilla found in 7 of these. Peptone enrichment methods are not altogether suitable for the study of soil vibrios, as they disappear from the medium. This is the probable explanation of the fact that we know little of the influence of soil upon the development of cholera epidemics.

W. F. Harvey.

MASLENNIKOWA (W. A.). Ueber biologische Eigenschaften der cholera-ähnlichen Vibrionen. [**Biological Characters of the Cholera-like Vibrios.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Apr. 12. Vol. 102. No. 4-5. pp. 148–157. [12 refs.]

Forty-five cultures were studied, 19 of which were water vibrios, 4 phosphorescent water vibrios, 11 inagglutinable vibrios from cholera cases or cholera suspects and 8 true cholera vibrios. The vibrios from cholera or cholera-like cases, which agglutinated to cholera serum, had no haemolytic power, whilst the inagglutinable were haemolytic. Cholera-like vibrios were not agglutinated by cholera serum.

The author divides his cholera-like vibrios into 3 groups called by him, No. 1 paracholera, No. 2 chemically inactive, No. 3 alkali-forming. No transformation of vibrios from the one group to the other was obtained. The first and largest group, which contained both phosphorescent and non-phosphorescent vibrios, was characterized by an indole positive reaction ; fermentation of sugars with acid production ; coagulation of milk ; proteolytic, haemolytic and diastatic action. The second group had none of these reactions The third group again was indole negative, did not coagulate milk and had neither proteolytic, haemolytic or diastatic action, but vibrios of this group actively produced alkali from the beginning in litmus milk and the sugar media.

A study was made of the largest No 1 group for variants : three types of colony were obtained from old cultures ; (1) transparent, moist smooth, and lustrous ; (2) rugose, greyish, more or less opaque, sticky and adherent to the surface of the medium ; (3) moist, lustreless and milk white. The differences in the appearances of these colonies was only evident after about 48 hours or later. They showed some variability in their biochemical reactions—haemolytic, cholera red, sugar fermentation, milk coagulation and proteolytic.

W. F. Harvey.

DERKATSCH (W. S.). Koagulation und Abbau von Eigelb durch Cholera- und choleraähnliche Vibrionen. (Uebersetzt von Dr. med. B. BRECHER). [**Coagulation and Decomposition of Egg-Yolk by Cholera and Cholera-like Vibrios.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6-7. pp. 319–326. With 1 chart in text. [17 refs.]

The medium for this reaction was prepared as follows : –

(1) Make a mixture of 150 cc. egg yolk and 850 cc. distilled water; (2) add normal soda solution until the mixture clears; (3) boil for 30 min. and filter through cotton wool into flasks; (4) sterilize 15 min. at 110 C. Its pH was 7·8.

Five groups of vibrios are described among the 45 cholera and 18 cholera-like strains studied.

1. *Cholera vibrios.* There is firm clotting of the egg yolk substrate in 42 to 72 hrs. Liquefaction occurs in 5 to 7 days, by which time the production of ammonia is evident. The amino-acid content of cultures may be higher, whilst the protease action is weaker in this group than in groups 2 and 3.

2. *Paracholera vibrios.* The clotting is less marked, but the hydrolytic decomposition of the medium is more pronounced than among cholera vibrios. Some strains produce a brownish colouration of the medium, like the cholera vibrios.

3. *Putrefactive vibrios.* Rapid coagulation occurs and equally rapid decomposition of the egg yolk substrate. There is milk-white colouration of the medium; ammonia is produced in 24 hrs. and sulphuretted hydrogen after 5 to 7 days. Great increase of amino-acids takes place in the culture.

4. *V. metschnikovi* is in a group by itself. It shows no coagulation, but there is slight increase of amino-acids in the culture and change of reaction.

5. *Alkali forming vibrios.* No coagulation. After 5 to 7 days slight diminution of the amino-acid content. No change of reaction.

The clotting of yolk of egg is a permanent and constant character of cholera vibrios, independent of their source, age and number of passages on ordinary media. It is not corellated with power to coagulate milk.

W. F. Harvey.

DAVID (Hans). Ueber eine durch choleraähnliche Vibrionen hervorgerufene Fischseuche. [**A Fish Epidemic due to a Cholera-like Vibrio.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Mar. 8. Vol. 102. No. 1-3. pp. 46–60. With 1 text fig. [16 refs.]

An epidemiological and bacteriological account is given of an organism capable of infecting carp and other fish; it belongs to the class of cholera-like vibrios. When first isolated it has the form of a short bacillus, sometimes slightly curved, becoming more truly vibrio-like with subculture. This vibrio grows best at room temperature and is not pathogenic for warm blooded animals, but kills certain fish and frogs. It is named *V. piscium.* Besides its relationship to the epidemic in fish, which is fully substantiated, the author treats at some length of its place among cholera-like vibrios. A high titre cholera serum agglutinates this organism in high degree, although not quite to the end titre of the serum used. Absorption and complement fixation tests, with antisera to *V. cholerae* and *V. piscium* respectively, suffice to separate the two and to show that *V. piscium* has no antigenic properties in regard to the true cholera vibrio.

A discussion of the possibility of transformation of the true cholera vibrio into an inagglutinable, saprophytic water type of vibrio occupies the final portion of the paper, which concludes with the observation that *V. cholerae* and *V. el tor*, cultivated at room temperature and administered in large dose to carp and frogs, kills these in 4–8 days with symptoms similar to those elicited by infection with *V. piscium.* Is it possible that cholera vibrios may undergo more rapidly in cold-blooded animals changes in the direction of transformation into water vibrios?

W. F. Harvey.

GOUBINE (V. M.). [Sur la réaction nitreuse du vibrion cholérique (en russe).] [**Nitrite Production by the Cholera Vibrio.**]—*Ann. Stat. Bacter. Agron.* 1926. No. 24. pp. 213–217. [Summarized in *Bull. Inst. Pasteur.* 1927. Apr. 15. Vol. 25. No. 7. p. 306.]

The article is one of a series of three in the same journal which deal with the production of nitrites from organic matter and ammonia by bacteria other than the genus *Nitrosomonas*. The formation of nitrites by *V. cholerae* is the basis of the cholera red reaction and Goubine finds that this reaction is not explainable by a reduction of nitrites. He has been able to demonstrate the production of nitrites by *V. cholerae* in a synthetic medium of calcium acetate to which is added glycocoll, asparagin, or ammonia. This production is of only minute but measurable quantities. [*v.* this *Bulletin*, Vol. 21, p. 888 (HIRSCH)].

W. F. Harvey.

SEN (Ajit Kumar). **Diagnosis of Cholera from Cellular Exudate. A Short Note.**—*Calcutta Med. Jl.* 1927. Mar. Vol. 21. No. 9. pp. 448–450. [2 refs.]

This paper supports work previously recorded by MAITRA, GANGULI and BASU—this *Bulletin*, Vol. 23, p. 187.

J. H. T. W.

MASHIMO (Shinichiro). [On the Mechanism of the Infection by Cholera Vibrios in the Animal Body. Experiments on Intestinal Infection. Communication II.]—*Kei-O Igaku (Jl. Kei-o Med. Soc.)* 1926. Aug. Vol. 6. No. 8. [Summarized in *Japan Med. World.* 1927. Mar. 15. Vol. 7. No. 3. p. 80.]

OGILVIE (W. H.). Cholera in the Army in India Nearly Fifty Years Ago.—*Jl. Roy. Army Med. Corps.* 1927. July. Vol. 49. No. 1. pp. 63–65.

PALMER (F. J.). The Causal Organism of Cholera.—*Indian Med. Gaz.* 1927. Apr. Vol. 62. No. 4. pp. 204–208.

ROBERTSON (R. C.) & ANNING (C. C. P.). The Cholera Epidemic of 1926 in Shanghai with Reference to the Clinical Treatment of 368 Cases.—*Jl. Roy. Army Med. Corps.* 1927. May. Vol. 48. No. 5. pp. 321–330. With 3 text figs. [3 refs.]

PLAGUE.

CUMPSTON (J. H. L.) & MCCALLUM (F.). **The History of Plague in Australia 1900-1925.**—*Commonwealth of Australia. Dept. of Health. Service Publication No. 32.*—238 pp. With 12 figs. (7 maps). 1926. Melbourne.

The history of plague in Australia during the quarter of a century from 1900 to 1925, as set forth in this report, reads like a familiar narrative, partly no doubt because it recalls the pioneer work of Ashburton THOMPSON and TIDSWELL, and partly because plague here has run a "normal" course, in the sense that it has not exhibited any striking peculiarity from an epidemiological point of view. The first case was recognized in January 1900 in Sydney, 6 years after plague was officially declared to be epidemic in Hong Kong, the starting point of the present pandemic. Since the port of Sydney is in frequent communication with infected places in China and India this interval may seem a long one. Actually, the first appearance of plague in Australia coincided with a time of rapid and world-wide dispersion of the disease. The infection in rodents and man persisted during the next 10 years, and this period was followed by a plague-free interval, also of 10 years, from 1910 to 1920. In 1921–1922 fresh outbreaks occurred in a number of ports on the Eastern coast of the country.

During the first decade there were 1,212 cases in the whole of Australia, New South Wales heading the list with 614 cases. The recurring outbreaks in Sydney, the capital of this State, furnished material for the admirable papers of THOMPSON. Charts reproduced in the volume under review demonstrate the close association of the epizootic and the epidemic in this city; rat plague invariably preceded plague in man. March, April and May were the months of greatest prevalence, and also the months when rat-fleas were most numerous. In August 1921 a death from plague in Brisbane was the signal for a recrudescence, with an extension to the ports in Queensland, and to Sydney in New South Wales. There were 58 cases in Brisbane, 33 in Townsville, 18 in Cairns, and 35 in Sydney. During the whole history of plague in Australia there has been little tendency for the disease to spread inland, and the series of outbreaks in 1921–1922 was strictly confined to the coast line. Infection spread from port to port along sea or water routes; rats trapped or found dead in a number of ships proved to be infected.

R. rattus, *R. norvegicus* and *Mus musculus* were the species of rodents which were plague-infected in the town and city outbreaks. The authors give tables from which it seems that the ratio of *R. rattus* to *R. norvegicus* captured on Australian and overseas vessels at Sydney and Melbourne in 1921–1922 was 40 : 1 (5,045 rats examined).

New South Wales and Queensland were the worst infected States from 1900 to 1909, and the rats there had a high infestation with *X. cheopis*, whereas those in Victoria, which was only slightly affected, had a minimal *cheopis* infestation. Tasmania has remained quite free from plague, and it is significant that *X. cheopis* has not been found there; in Hobart all the fleas found on rats have proved to be *C. fasciatus* [see p. 197, but also the table on p. 106, which gives *Ctenopsylla musculi* as the common rat-flea of Tasmania]. *X. cheopis*, *Ctenopsylla musculi* and *Ceratophyllus fasciatus* were the most important species found on rats examined at Sydney in 1921–1922; they were present in the ratio roughly of 12 : 7 : 5 in the order named; and they infested *R. rattus* and *R. norvegicus* to nearly the same extent.

An important feature of plague in Australia is the relative or absolute immunity of certain localities. Thus Newcastle, a seaport only 70 miles by sea from Sydney, with an immense volume of inward and outward

shipping, escaped infection during 8 years out of 10, and when infected had only 14 cases. As already stated there has been little tendency for places inland to be attacked. Victoria, with Melbourne as its chief city, and South Australia with Adelaide, were only lightly invaded. The absolute immunity of Tasmania is partly explained by the absence of *X. cheopis*, but it would seem that specific observations on the problem of local immunity in Australia have not been made; at least the reviewer cannot find any explanatory comments on the subject in this report.

Attention has recently been drawn to the risk of the dissemination of plague in the periodical swarms of mice across the countryside, especially since the association of man and mice during these swarms has been proved by the occasional transference of the fungoid disease of mice to man. However, the mouse is not regarded as an efficient carrier of plague, and its flea infestation is so slight as to be almost negligible. The question may be asked whether there is any danger of plague spreading to the rabbit population of Australia; the point is not mentioned in this report.

The resolutions of the "Commonwealth and States of Australia" Conference on Plague, which was held at Sydney in 1921, are included in an appendix, and are worth consulting as a collective expression of well-considered opinions on preventive measures against plague. Not the least important of these conclusions has reference to the fostering of an enlightened and active public opinion on the parts played by rats and rat-fleas in the spread of plague.

Another appendix relates to epidemiological records of plague outbreaks. The authors state that during the plague years in Australia much matter of importance either has not been recorded or has been lost. They have therefore drawn up a schedule which may serve as a guide for recording essential data. Every plague worker who has spent time searching for information in the archives of a plague-infected country will applaud the principle of encouraging a uniform record scheme with due provision for the free expression of individual opinions.

Another appendix consists of a comprehensive bibliography of plague in Australia.

The authors of this report might with advantage have added contributions on the laboratory findings and clinical experience of plague in Australia by colleagues with special knowledge of these aspects of the subject. A curative serum has been in some degree effective in the treatment of plague in Australia: a reasoned analysis of its mode of action and the results obtained would have been instructive. Incidentally the statement in the Introduction that HAFFKINE in Bombay developed antiplague serum should be amended when opportunity offers.

G. F. Petrie.

HIRST (L. Fabian). **Researches on the Parasitology of Plague. Part 2.** —*Ceylon Jl. Sci.* (Sect. D. Med. Sci.). 1927. May 16. Vol. 1. Pt. 5. pp. 277–455. With 1 text fig. 4 charts & 5 maps. [City Microbiol. Lab., Colombo.]

Those who find interest in exploring the outlying and unsettled territories of research into plague will discover much to stimulate reflection in Part ii of Dr. Hirst's volume on the Parasitology of plague. The author discusses his own experiences in relation to those of other workers, and in so doing gives evidence of a wide and critical acquaintance with recent work on plague. The range of his enquiry is so extensive that abstraction is not easy, but the following notes will, it is hoped, give some idea of the topics surveyed.

X. cheopis.—The ancestral home of this species is probably the Nile valley, a view supported by the fact that *R. rattus* in Upper Egypt has a virtually pure infestation with this flea. *R. rattus* appears to be the definitive host of *X. cheopis* as *R. norvegicus* is that of *C. fasciatus*. The former species is widely distributed on rats, especially *R. rattus*, in localities

between the 35° of latitude north and south of the equator. The incidence of bubonic plague is, in general terms, greatest where the climatic conditions or other circumstances favour the breeding and activity of *X. cheopis*. The author has not been able to trace a single instance of bubonic plague becoming endemic among the rats in any locality in the absence of *X. cheopis*, and he regards this species as the chief vector of plague between the house rats and between them and man. There is strong evidence that the severity of plague in a particular place is largely governed by the magnitude of the *cheopis* population, as, for example, in Colombo and in India. Dr. Hirst has drawn up an interesting table (Table XXXV) which shows a high degree of correlation between the *cheopis* flea-index on rats and the mean plague mortality *per mille* for a number of towns and cities in India.

X. astia.—This is characteristically a Southern Asiatic species. Two years before plague broke out in Colombo the author collected about 400 rat-fleas during the plague season in the centre of the area where *X. cheopis* is now the most prevalent flea. All these fleas were identified by Rothschild as *X. astia*. Rat plague first appeared in February 1914, and in the following month 16 out of 199 fleas from the same area were found to be *X. cheopis*; this species has since been the predominating one in the plague area of Colombo. In 1913 the author discovered that the rat-fleas in Madras—a city notable for its immunity from plague—were purely *X. astia*, and in consequence of these observations he originated the theory that local prevalence of *X. astia* on rats and local immunity to plague are co-related. In Dr. Hirst's view the distribution of *X. astia* and *X. cheopis* in India is not, as opponents of the theory contend, attributable to climatic factors, but is readily explicable on zoo-geographical lines. The optimal conditions for the activity of *X. astia* are not precisely known, but this flea is probably adapted to a more restricted range of temperature than *X. cheopis*, extending a little higher but not nearly so low, and it is less adapted to drought than *X. cheopis*. There is evidence that plague infection produces a more rapidly fatal effect on blocked *X. astia* than on blocked *X. cheopis*, and this circumstance is probably the most important cause of the relative inefficiency of *X. astia* as a transmitter of plague under tropical conditions. Work on the subject is being pursued at the present time in India; eventually, no doubt, the factors involved in the "astia" problem will be unravelled.

X. brasiliensis.—The original home of this species is probably Central Africa. It is well established on rodents throughout Peninsular India. There is no detailed information regarding its bionomics, its ability to convey plague experimentally, and its relation to human plague.

C. fasciatus.—The author thinks that this species is probably an inefficient carrier of plague both from rats to man and from rat to rat.

In the view of Cragg and Hirst the results of laboratory experiments on flea transmission should be cautiously applied to field conditions. They point out as a possible analogy that *Anopheles rossii* is an effective experimental transmitter of *Plasmodium vivax* and is yet an ineffective transmitter in nature.

When plague broke out in Colombo there was a greater proportion of "septicaemic" than of bubonic cases, the former term being used in the sense that the patient died of plague before the appearance of discoverable enlargement of lymphatic glands. The blood of these cases *post mortem* contained numerous virulent plague bacilli. In later years the type of the disease has gradually changed so that now the septicaemic cases are in the minority. In Colombo it has occasionally happened that patients develoing septicaemic plague have been hurried out of the city. Dr. Hirst agrees with the workers in India that in such an event the chief risk is the lighting up of an epizootic focus in the new place of abode by infected rat-fleas transported on the patient's body or in his personal effects, but he thinks also that if the new habitation should be very rat-infested, wandering *X. cheopis* may become primarily infected by feeding on such a septicaemic

patient and so initiate an outbreak of rat-plague. In the author's view this possibility, though of little practical importance, should not be altogether disregarded.

The last section of the report deals with the subject of plague prevention. In Colombo special attention is naturally paid to the *cheopis* areas as delimited by flea surveys, and the result has been that during 1926 there were only 13 human plague cases and only 8 discovered cases of rat-plague. There is a constant danger of re-importing the infection from Rangoon, which is becoming the principal focus of plague infection among the ports of the East. In Colombo the association between imported grain and plague is particularly clear, and indeed in this city grain is the chief vehicle of infection. The greatest danger probably arises from the importation of grain and gunny bags that are heavily infested with the eggs and larvae of *X. cheopis* owing to storage in rat-infested warehouses at the place of export. If the distance between the ports of despatch and receipt is comparatively short an effective interchange of flea species by this means may occur, but over long sea journeys colonies of ship rats are the carriers and distributing agents. The final sentence of the volume summarizes the author's views on the prevention of plague and at the same time expresses in a condensed form the whole subject matter of his studies and researches. It reads as follows—"The prevention of the spread of plague is a problem in applied biology depending for its solution on an exact and comprehensive study of local conditions and a catholic understanding of the intricate and ever varying relationships between the virus of the disease, the cold-blooded arthropod vector, and its warm-blooded mammalian host."

G. F. Petrie.

GOYLE (Amar Nath). **On the Transmission of Plague by** *Xenopsylla astia* **and** *X. cheopis*. **Preliminary Observations.**—*Indian Med. Gaz.* 1927. June. Vol. 62. No. 6. pp. 317–318. [7 refs.]

Of the three species of Xenopsylla found on Indian rats *X. brasiliensis* has a limited distribution; *X. cheopis* and *X. astia* are extremely common. The evidence at present available with regard to the relationship of the incidence of plague to the distribution of the different species is extremely conflicting. It was considered by the U. P. Government that this important question demanded renewed enquiry and Dr. Goyle was deputed to undertake the investigation. The methods of experiment were essentially similar to those used by the Indian Plague Commission (1906), HIRST (1923) and TAYLOR and CHITRÉ (1923). As it is important to identify the fleas in the living state the method devised by TAYLOR and CHITRÉ was used. A series of plague transmission experiments were carried out with rats from Madras and the U.P. during the months of November and December, 1926, at Lucknow. The results of two series showed some difference. Out of seven experiments with Madras rats in which *X. astia* was used successful transmission occurred in three; under similar conditions, three out of seven experiments with *X. cheopis* were successful. In the eighth experiment the rat inoculated in the *cheopis* cage did not die of plague, but there was successful transmission with *astia*. With the Jhansi rats the results so far obtained show that *X. cheopis* is a much more efficient vector than *X. astia*; in a series of twelve experiments there has been successful transmission in nine with *cheopis* and only three with *astia*. In two experiments with guineapigs *cheopis* has carried plague in both, *astia* once only. [cf. this *Bulletin*, Vol. 24, p. 453 and above (HIRST)].

J. H. Tull Walsh.

GUERRINI (Guido). Topi, pulci e peste in Giappone. [**Rats, Fleas and Plague in Japan.**]—*Giorn. d. Reale Soc. Ital. d'Igiene.* 1927. Vol. 44. No. 1. 8 pp.

This paper is largely statistical. Nearly half a million rats were examined during the 18 months February, 1909–July, 1910. Among this number, 0·1 per cent. of the *norvegicus* species were found infected with plague, but 1·55 per cent. of *alexandrinus*. In Tokio and Aichi the latter species was positive in 90·48 and 86·9 per cent. respectively, but in Prefecture of Miye *R. rattus* was positive in 53·68 per cent., *R. norvegicus* in 24·23, and *R. alexandrinus* in 22·09 per cent.

As regards the fleas, *Ceratophyllus anisus* and *C. fasciatus* were widespread; *Paradoxospyllus curvispinosus*, a species peculiar to Japan, was very frequently met with, especially in Tokio; *Xenopsylla cheopis* only rarely, in sea-ports; *Ctenopsylla cuniculi* common everywhere in the country. In Yokohama, among 2,508 fleas there were 2,276, or 90·7 per cent. *C. anisus* and *P. curvispinosus*, and only 9 of *X. cheopis* and *Pulex irritans* together. Except *X. cheopis* all are most numerous in winter; they increase gradually from September to January, rapidly in January and February, and decrease rapidly in May.

From examination of fleas caught in Yura all the species were shown to be carriers of plague, except *Ceratophyllus felis*.

H. Harold Scott.

NIKANOROW (S. M.). Der gesunde Mensch als Träger der Pestbazillen und seine epidemiologische Rolle. [**Healthy Man as Carrier of Plague Bacilli.**]—*Seuchenbekämpfung.* 1927. Vol. 4. No. 3. pp. 140–145. [16 refs.] [State Microb. & Epid. Inst. for S.E. of U.S.S.R.]

The author remarks quite rightly that it is not always possible to discover the source of an outbreak of plague and he then puts the question: where has the plague virus been maintained in the interval? That it is revived often from an epizootic among rodents is undeniable. The old belief that plague was contracted from clothes, etc., is now seldom held. And now the theory is held that man may be a carrier of plague and the cause of an epidemic. The author notes several references to cases in which the infection might possibly have been due to such a source. He quotes a case which came under his own observation where a relation was supposed to have brought plague infection into a Kirgiz family. Three cases of bubonic plague occurred; all died. The relative "S.J." was isolated and disinfected. After six days, under observation, he returned to his own family. Seven days later his wife was attacked with plague. S.J. was again isolated and all his belongings were disinfected. Twelve days later—November 28th, 1923—he went to stay with relatives and again plague appeared. So it would appear that S.J. had infected three families. Thus S.J. was marked as a healthy carrier. Fluid was taken, on December 20th, from some slightly enlarged axillary and inguinal glands and injected into a guineapig, which died of plague. During the whole period S.J. showed no signs of illness. This matter therefore requires careful study. [*ante*, p. 34 (LEGER)].

J. H. T. W.

DURAND (Paul) & CONSEIL (Ernest). Très longue persistance ganglionnaire du bacille de la peste chez l'homme après guérison. [**Persistence of** *B. pestis* **in Glands after Recovery.**]—*Arch. Inst. Pasteur de Tunis.* 1927. Apr. Vol. 16. No. 1. pp. 92–98. [8 refs.]

The authors describe two cases of plague which recovered but still retained plague bacilli in glands near the original buboes 12 months and 2 months after the date of recovery. Positive results were not obtained either under the microscope or by culture from material taken by simple puncture; but, from portions of glands removed, cultures were obtained. The authors emphasize the danger of such carriers.

J. H. T. W.

GIRARD (G.). Epidémiologie de la peste pulmonaire à Madagascar [**Pneumonic Plague in Madagascar.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 233–251. [3 refs.]

Primary pulmonary plague directly contagious from man to man has been observed in Emyrne for the past five years. The infection is conveyed by bacilli in the expectorated sputum. The author states that although the lungs may contain *B. pestis* contagion is unlikely when there is no expectoration. The increase of virulence of the infection after passage explains the rapid spread of an epidemic and the shortening of the incubation period and the rapid mortality.

J. H. T. W.

APERS (E.). & VAN BOECKEL (L.). De l'importance et des difficultés du diagnostic différentiel entre la peste bubonique fruste ou ambulatoire et la lymphogranulomatose inguinale subaigue ou bubon climatérique. [**Differential Diagnosis of Abortive or Ambulatory Plague and Lymphogranuloma or Climatic Bubo.**]—*Bull. Office Internat. d' Hyg. Publique.* 1927. Feb. Vol. 19. No. 2. pp. 184–199. [83 refs.]

This question of the difficulties and importance of diagnosis between possible plague buboes and enlarged inguinal glands due to other causes is discussed at great length and examples are given. These cannot be given in full. A very full list of authors consulted is to be found at the end of this paper. [v. this *Bulletin,* Vol. 20, p. 743 (TANON & CAMBESSÉDÈS)].

J. H. T. W.

CAZENEUVE (H. J.). Les foyers endémiques de la peste en Transbaïkalie et les épidémies de peste pneumonique en Mandchourie. [**The Endemic Foci of Plague in Transbaikal and Epidemics of Pneumonic Plague in Manchuria.**]—*Rev. d' Hyg. et de Méd. Préventive.* 1927. Mar. Vol. 49. No. 3. pp. 161–176. With 2 text figs. & 2 maps. [9 refs.]

This is an interesting and concise compilation. It will be useful to those who have not read the numerous papers on plague in Transbaikalia and Manchuria which have been noticed in previous volumes of this *Bulletin.*

J. H. T. W.

BOSTON (H. Merrick). **Two Cases of Bubonic Plague.**—*Lancet.* 1927. Apr. 23. pp. 870–871.

Owing to the comparative rarity of plague in this country these two cases are of interest :—

A boy, aged 10, was admitted to the David Lewis Hospital, Liverpool, August 28th, 1926, with fever and some delirium. In the left groin there were enlarged glands, painful on palpation. Temperature 106° F. ; pulse 36 (*sic*) and respiration 36. Widal reaction was negative for the typhoid group. Blood and fluid were put into culture media but were sterile. The boy died on August 30th. A mass of haemorrhagic glands removed from the left groin gave smears containing a bacillus suggestive of *B. pestis.* A guineapig and a rat were inoculated and within 24 hours were fatally affected ; they died in 48 hours and cultures from them showed *B. pestis.* The father of the boy, aged 60, came to the hospital on August 30th in connexion with the death of his son. He looked ill and complained of pains and headache with nausea. He had a small swelling in the right groin, not painful. His temperature was 98·6° F. and varied between that and 97° F. while in hospital. Pulse 120 and respiration 28. The gland was removed and was found to contain pus. Bacteriological examination showed *B. pestis.* The man recovered and no further cases were seen. The father worked in an office on the grain wharf and there were rats in his office and it is suggested that the infection came from a grain ship.

J. H. T. W.

i. NIKANOROFF (S. M.). Novi Endemicheski Ochag Chumi v Predjelach S.S.S.R. [**A New Plague Focus in the U.S.S.R.**]—*Vjestnik Microbiologii & Epidemiologii.* Saratov. 1927. Vol. 6. No. 1. pp. 3–8. (French summary p. 125). With 1 map in text. [2 refs.]

ii. IGNATIEV (A.). Busachinskaya Vspishka. [**The Plague Outbreak at Buzashi.**]—*Ibid.* No. 2. pp. 160–163. (English summary pp. 258–259). [2 refs.]

i. A new plague focus has lately been detected in the Mangishlakski steppes of Transcaspia, a vast territory inhabited by nomadic Kirghese. Two outbreaks were observed there in 1926. The first, taking place in the summer and early autumn, was responsible for 41 fatal cases ; all with exception of the first victim (who had an axillary bubo and secondary pneumonia) suffered from primary pneumonic plague. An expedition under Nikanoroff's leadership arriving after the epidemic confirmed the diagnosis through autopsies on the first and two other victims, and recorded that the outbreak was traceable to an epizootic among gerbilles (*Rhombomys opimus* Licht.). A few animals with manifest plague were found. A guineapig injected with an emulsion prepared from the spleen of 22 apparently healthy rodents, succumbed to plague ; the same result was obtained with a guineapig which had been injected twice with a large number of parasites (fleas and ticks) found on the rodents and specially in the burrows.

Nikanoroff suspects that infected rodents had been imported into this area from Turkestan (v. this *Bulletin*, Vol. 23, p. 179, GREKOFF) through caravans.

ii. Ignatiev furnishes details regarding the second outbreak occurring further westwards near the Buzashi peninsula in October-December, 1926, when 16 bubonic cases (6 with secondary pneumonia) and 8 pneumonic ones occurred with 20 deaths. The author states that of

these cases 17 were traceable to the epizootic among the gerbilles, one had evidently been caused by contact with plague-infected hares (? *Lepus timidus*), while 6 apparently arose from the killing and dissecting of diseased camels.

Both outbreaks were cut short because the neighbours of the affected families soon realized the infectious character of the malady and kept away.

Wu Lien-Teh & R. P.

NIKANOROV (S.) & KNIZAEVSKY (A.). *Rhombomys opimus* Licht.—porteurs de peste dans le Turkestan et dans la région Trancaspienne. [*Rhombomys opimus* **Carrier of Plague in Turkestan and the Transcaspian Region.**]—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. French summary pp. 256–258. [1 ref.] [In Russian pp. 154–159. With 4 text figs. 2 refs.] [Microb. & Epid. Inst., Saratov.]

The investigations recorded were carried out by an expedition from the "Microbiology and Epidemiology Institute, Saratov" in 1924 and confirmed in 1926. In Turkestan deaths among *Rh. opimus* coincided with the outbreak of epidemic plague. Two gerbilles captured alive died in 8–10 hours and showed signs of plague. *B. pestis* was cultivated from them. Again in 1926 gerbilles were found containing many plague bacilli. A description of *Rh. opimus* is given, with figures, in the Russian text. The ectoparasites of these gerbilles, identified at the Institute were :—

Ctenophthalmus dolichus, *Ophthalmopsylla volgensis*, *Rhadinopsylla cedestis*, *Ceratophyllus*—group *laeviceps* ; *Xenopsylla*—group *conformis*, *Coptopsylla*—near to *lamellifer* and *Neopsylla*—near to *setosa*.

A few observations made with living fleas showed that *C. laeviceps* would bite the guineapig, white rat, mouse and spermophile.

J. H. T. W.

KONOVALOVA (S.). **Fleas, the Inhabitants of the Spermophile Burrow—the Carriers and Preservers of Plague Infection.**—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 1. English summary p. 128. [In Russian pp. 39–40.]

Working with a Research Anti-plague Detachment around the village of Zavetnoë the author examined 17 spermophile burrows for infected fleas during May, 1926. From burrow No. 7 43 fleas were taken and a culture of *B. pestis* was obtained. A spermophile inoculated with the emulsion from these fleas died within 7 days.

J. H. T. W.

TIKHOMIROW (J. J.). Sur les liens épidémiologiques des épidémies pesteuses d'hiver dans les Steppes Kirguisiennes avec les épizooties pesteuses des souris. (D'après les études épidémiologiques pendant l'épidémie pesteuse dans le gouvernement d'Oural en 1913 et dans la contrée Sékréta en 1905). [**Relation of Winter Plague to Epizootics in Rodents.**]—*Arch. Sci. Biol.* 1926. Vol. 26. No. 1–3. French summary p. 201. [In Russian pp. 95–102.]

The results of these investigations contain nothing very new ; but one section from the summary is worth quoting : If a considerable

epizootic is present among mice and other rodents and if the conditions of food and life become unfavourable these animals migrate to new areas; during this migration they will infect the rodents of those localities in which they rest or remain [cf. this *Bulletin*, Vol. 22, p. 771 (PATERSON)].

J. H. T. W.

GOLOV (D. A.) & JOFF (I. G.). Blochi Suslikov kak Chraniteli Chumnoi Infekzii v Zimnem Periode. [**The Suslik Fleas as Reservoirs of Plague Infection during Winter.**]—*Vjestnik Microbiologii & Epidemiologii.* Saratov. 1926. Vol. 5. No. 4. pp. 239–248. French summary pp. 329–331. [1 ref.]

The authors, experimenting with *Ceratophyllus tesquorum*, *Neopsylla setosa* and *Ctenophthalmus agyrtes*, are satisfied that the sisel (suslik) fleas kept in test-tubes at temperatures corresponding to those prevailing in the burrows at wintertime, remain alive and active for months. Likewise, they could demonstrate experimentally that the fleas were able to feed upon hibernating susliks (and even upon corpses soon after death). Similar observations were also made under natural conditions. Fleas starved in empty burrows were found to survive up to 10 months; their survival in burrows left by the hosts is suggested also by a few observations made when digging deserted burrows in the fields. (This is of special importance, as the susliks usually die of plague above ground, whereas a good number of the fleas remain constantly in the holes.) Further experiments show that suslik fleas may survive for months at low temperatures (min. —25·2° C.), provided the atmosphere is sufficiently moist.

Plague infected fleas which were afterwards kept starving in test-tubes survived up to 206 days; all fleas tested yielded at death living and virulent plague bacilli.

This stimulating paper shows that the suslik fleas play perhaps no little role in the carrying over of the infection. When we consider that the virus is preserved in the rodents themselves for long periods (see Nikanoroff, this *Bulletin*, Vol. 23, p. 184, and Gaiski, *ibidem*, Vol. 24, p. 32), it may be seen that conditions are rather favourable for a perpetuation of the disease and that there is no need to assume a periodical reinfection of the susliks.

Wu Lien-Teh & R. P.

i. TRAUT (I. I.). **Report on the Activity of the Gas Expedition in the Year 1925.** Edited by the Laboratory for Research upon Poisonous Substances of the Commissariate for Agriculture, Saratov, 1926. In Russian. 108 pp.

ii. ——. **Note on the Methods of Poisoning Ground Squirrels (Susliks) in the Endemic Plague Regions.** Leningrad, 1927. In Russian with English summary. 15 pp.

iii. ——. **Report of the Gas Expedition on the Fight with Susliks in the Endemic Plague Regions in the Year 1926.** Leningrad, 1927. In Russian with English summary. 21 pp.

In South-East Russia, as in other plague areas, the campaign against wild rodents, at first undertaken by the medical authorities, is now entrusted to agricultural experts. Traut reports extensively upon this new activity.

Considerable progress has been made since a rational fight against the susliks was started in 1924 (see this *Bulletin*, Vol. 23, pp. 617, 618–19). Though attempts to destroy the rodents with chloropicrine gave encouraging results, this substance does not seem to have been widely used, the work

being conducted as heretofore with carbon bisulphide and chlorine. Much attention was paid to the question how far all these methods could kill the parasites as well as the rodents in the burrows. Traut concludes that, though the parasites may survive in burrows containing fresh nests, they will not become dangerous for a further spread of the disease if such burrows are plugged up after the treatment.

Still more instructive than this and other modifications of the technique is the enlarged scope of the work. Formerly it was restricted to the creation of rodent-free belts round settlements threatened by epizootics. Now attention is paid also to localities away from the villages where the population is likely to come into contact with the susliks. In addition to this palliative work wholesale destruction is carried out in suitable regions. In 1926 nearly 150,000 acres with 4,929,893 holes were so treated at a cost of over 65,000 roubles (£7,000). The immediate results, as manifested by the absence of human plague, appear to have been excellent, while the number of susliks surviving in the districts treated, though varying to some degree, was generally very low.

It remains to be seen how far the few surviving rodents may multiply and thus infest the areas again. Also it must be noticed that the funds granted for the work were not regularly forthcoming and practically never sufficient to do all that was planned. Lack of co-operation from the population was another factor contributing to the difficulties of the campaigns. Appreciation is the more deserving for what has been accomplished.

Wu Lien-Teh & R. P.

BURGESS (A. S.). **The Selection of a Strain of *Bacillus pestis* for the Preparation of Vaccine, with Special Reference to the Effect of Animal Passage on Virulence.**—*Jl. of Hyg.* 1927. July. Vol. 26. No. 2. pp. 152–162. [6 refs.] [Med. Research Inst., Accra.]

Recent work on the immunizing value of different strains of the same organism has shown the necessity of attention to the antigenic characters of those used in the preparation of vaccines. It is this point which is dealt with in this paper. The common domestic rat of Accra, *Cricetomys gambianus*, which is very susceptible to inoculation with plague, was used in the experiments. In the opinion of the author virulence of the strain used is of prime importance for the preparation of a satisfactory vaccine. Infrequent subculture of strains kept at room temperature afforded no evidence of loss of virulence, but a marked fall of virulence occurred with passage through vaccinated animals, that is to say through animals possessing well marked but incomplete immunity. Moreover the virulence thus lost was not restored by passage of the strain through non-immune rats and it seems evident from the facts that the procedure had given rise to a stable, avirulent, rough strain of the organism. Again it is probable that this passage of a virulent strain through naturally immune rats, which may have been included among those used in experiments, accounts for the finding that the *B. pestis* lost virulence in the course of passage through rats, and possibly is one of the factors accounting for subsidence of an epidemic in nature.

Since vaccinated, as well as non-vaccinated animals, died after infective inoculation, certain conditions were laid down for the estimation and record of degrees of protection afforded, degree of virulence of culture and degree of susceptibility of an animal and this was based on the time elapsing between infection and death. A time interval of

408 hours, was allotted for recovery and "was obtained by adding 48 hours, as a margin, to the longest survival period (360 hours) obtained out of all the animals infected (351), excluding those which recovered." The difference between the survival period of each animal and the average survival period of the controls (48 hours) was first determined and the efficiency of a vaccine expressed as the ratio of the average difference to 360. The author finds that, whereas vaccine prepared from virulent strain gives considerable protection against infection with virulent strain, it does not protect at all against avirulent strain. He also finds that vaccine prepared from avirulent strain gives little or no protection against infection with virulent strain although animals recovering from infection with an avirulent strain are immune to subsequent infection with virulent strain.

W. F. Harvey.

NAIDU (B. P. B.) & SHAMSHER JANG. **A Note on the Nutrient Broth now used for the Culture of *Bacillus pestis* and its Hydrogen-Ion Concentration.**—*Indian Jl. Med. Res.* 1927. July. Vol. 15. No. 1. pp. 135–139. With 1 chart. [10 refs.] [Haffkine Inst., Parel, Bombay.]

Haffkine's plague prophylactic is essentially a culture of plague bacilli grown in a liquid medium for six weeks at room temperature, sterilized by heat at 60° C. for 15 minutes and carbolized to contain 0·5 per cent. of phenol. Owing to the prejudice of the people of India against the use of commercial peptone, Warden's peptone, prepared from goats' flesh, came into use towards the end of 1898. This was prepared by heating finely minced goats' flesh (1 kilo) with hydrochloric acid (150 cc.) in water (2 litres) at three atmospheres pressure for six hours. The filtered solution being acid was neutralized with caustic soda, resulting in the formation of some 80 gm. of common salt. To bring the salt content to 0·5 to 0·75 per cent. the fluid was made up to from 12 to 16 litres with water. This medium was much diluted, had a dark brown colour and was variable in composition. GIBSON attempted to clear the medium with charcoal. In 1904 GIBSON made further modifications and the improved medium was used by BANNERMAN for the manufacture of anti-plague vaccine in 1905 and continues in use :—Goats' flesh freed from fat is minced. To every kilo of flesh 90 cc. hydrochloric acid are added ; the jar is then placed in a hot-water-tub and kept at 70° C. for three days ; 60 to 80 cc. of a 40 per cent. caustic soda solution are added. The peptone is then sterilized by steam for one hour at 100° C. at ordinary atmospheric pressure. It is filtered and to every litre of filtrate two litres of boiling water are added. This is again filtered into one litre flasks, plugged with cotton-wool and placed in a steam sterilizer for one hour and is then ready as a culture medium. The best results are obtained with a broth of the initial pH 6·8.

J. H. T. W.

HIMMELFARB (J. K.). Zur Differentialdiagnose zwischen dem *Bac. pestis* und dem *Bac. pseudotuberculosis rodentium* auf Kohlehydratnährboden. [**Differentiation of *B. pestis* and *B. pseudotuberculosis rodentium* on Carbohydrate Media.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. July 1. Vol. 103. No. 1-3. pp. 39–41. [State Bact. Inst., Odessa.]

HIMMELFARB (J. K.). Zur Frage der Differenzialdiagnose zwischen dem *Bac. pestis* und dem *Bac. pseudotuberculosis rodentium* auf Kohlenhydratnährboden.—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 1. German summary p. 135. [In Russian pp. 82–85.]

The degree to which glucose is fermented has been used by OTTEN for the separation of these two organisms. In this study maltose peptone water, of pH7.0–7·2 and in concentrations of 1, 0·5, 0·25, 0·1, and 0·05 per cent., has been used for the same purpose. This medium, tubed in quantities of 1 cc., should be sown with 1 cc. of a suspension of the test organism, containing 50 to 75 million bacteria : it is tested for its reaction by the addition of 2 drops of 0·5 per cent. alcoholic methyl red solution after 24, 48 and 72 hours. incubation at 28–30° C. The quantitative relationship between medium, concentration of maltose and initial quantity of the test bacterium should be exact, if the reaction is to succeed. A yellow colouration, indicative of the alkaline modification of the indicator is characteristic, within the limits given, of *B. pestis* whereas *B. pseudotuberculosis rodentium* produces no modification of the red colour of the indicator.

W. F. Harvey.

MORALES VILLAZÓN (Néstor). La virulencia del bacilo pestoso en medios con y sin Cloruro de sodio. [**Virulence of** *B. pestis* **in Media with and without Chloride of Sodium.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1926. Mar. Vol. 4. No. 4. pp. 385–392.

As the result of numerous inoculations into animals in the laboratory the author finds that :—

1. Cultures in media deprived of chloride of sodium are less abundant than on ordinary agar media.
2. There is no fundamental difference in virulence of the bacillus in the one or the other medium.

J. H. T. W.

EVTIKHIEV (A.). Organisation antipesteuse actuelle, ancienne et future de la Sibérie.—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. French summary p. 261. [In Russian pp. 176–181.]

GAÍSKY (N. A.). La peste chez les spermophiles hibernants (*Spermophilus mugozaricus*).—*Arch. Sci. Biol.* 1926. Vol. 26. No. 1–3. French summary p. 202. [In Russian, pp. 115–121. 4 refs.] [*ante*, p. 33.]

HICKS (E. P.). The Relation of Rat-Fleas to Plague in Shanghai.—*Jl. of Hyg.* 1927. July. Vol. 26. No. 2. pp. 163–169. With 1 chart in text. [11 refs.]

IGNATIEV (A.). Plague Outbreak at Buzachin.—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. English summary pp. 258–259. [In Russian pp. 160–163. 2 refs.]

RANGEL (Doutorando Mario). Em torno de dois casos de peste.—*Rev. Med.-Cirurg. do Brasil.* 1927. Feb. Vol. 35. No. 2. pp. 37–42.

RENZO (Alberto). Sobre dois casos de peste.—*Brasil-Medico.* 1927. Mar. 12. Vol. 41. No. 11. pp. 223–226.

ROHARDT (Wilh.). Beiträge zur Klinik der Pest.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Apr. Vol. 31. No. 4. pp. 166–179. [1 ref.]

SUKNEFF (W. W.). Kurzer Ueberblick ueber die Epidemiologie der Pest während der letzten 8 Jahre im transbaikalischen endemischen Pestherd.—*Cent. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6-7. pp. 338–347. With 3 text figs. [26 refs.]

TCHOURILINA (A. A.). Recherches épidémiologiques sun la peste.—*Arch. Sci. Biol.* 1926. Vol. 26. No. 1–3. French summary p. 200. [In Russian pp. 71–93. With 1 map.]

REVIEWS AND NOTICES.

BUXTON (Patrick A.) [M.R.C.S., D.T.M.& H. Director, Dept. of Medical Entomology; London School of Hygiene & Tropical Medicine.] Assisted by HOPKINS (G. H. E.) [M.A., F.E.S.] **Researches in Polynesia and Melanesia. An Account of Investigations in Samoa, Tonga, the Ellice Group, and the New Hebrides, in 1924, 1925. Parts I-IV (Relating principally to Medical Entomology).**—No. 1 of the *Memoir Series of the London School of Hygiene & Tropical Medicine.*—pp. xi+260. With 43 text figs. & 12 plates. 1927. July. London: School of Hygiene & Tropical Medicine. [10s. 6d.]

The book is an account of investigations principally relating to entomology in Samoa, Tonga, the Ellice Group, and the New Hebrides during 1924 and 1925. The joint authors are to be congratulated on the production of an interesting and attractive work which at the same time provides a study of the entomology of the Islands of the South West Pacific, and a critical examination of many of the puzzling factors governing mosquito development and bionomics.

Part I deals with the geography and a description of the Islands; Part II, with the climate, solar radiation, rainfall, atmospheric temperature and humidity, winds and evaporation, and with the readings of the katathermometer.

Part III presents an account of the Myriapoda, Arachnida (Acarina) and Insecta. The centipede *Scolopendra subspinipes*, Leach, is common in Samoa, and the authors describe the effects of its bites on human beings—from minor to fairly severe symptoms being set up. Of the *Arachnida*, 5 species of ticks are recorded, 2 species of mites from rats, and from clinical observations *Sarcoptes scabiei*, var. *hominis*, Hering, is thought to be common in Samoa. Two scorpions, *Isometrus maculatus*, Gerv., and *Harmurus australasiae* (Fabr.) were found fairly frequently in many of the islands, but the effect of the sting of either is said to be very slight.

Under the section devoted to the Insecta, genera and species of a large number of separate Orders are recorded, the most interesting from the medical aspect naturally being the *Siphonaptera* and the *Culicidae*. The human flea, *Pulex irritans*, Linn., is said to have been introduced to the Pacific Islands probably by Europeans, and it is not a very common species. *Xenopsylla cheopis*, Roths., the rat flea, was found to have a low average density on the rats captured in Samoa—less than 2·5 flea per positive rat. *Ctenocephalus felis*, Bouché, the only other flea recorded by the authors, is said to be often found on cats and dogs.

From pp. 66 to 124 the Culicidae of these islands receive attention. One Anopheline, *Anopheles* (*Myzomyia*) *punctulatus*, Dönitz (syn. *A.* (*Nyssorhynchus*) *annulipes*, var. *moluccensis*, Swell.), and sixteen Culicine species are recorded and in part described, the observed geographical distribution also being mentioned. Excellent text figures are provided illustrating the taxonomic characters of many of the larvae.

The remainder of Part III includes a section entitled "General Notes on Culicidae" in which several interesting aspects of mosquito ecology, bionomics and control are discussed, and Part III ends with a key for the identification of some of the larvae, pupae, and adults.

Part IV, Sections I–V, "Experiments Performed on *Aëdes variegatus* and *Aëdes argenteus*" with Appendicies I–IV, constitute to the scientific investigator perhaps the most interesting part of the book.

Section I. "A Study of the Factors which control Egg-laying in *Aëdes*" describes the experiments undertaken by the authors to analyse the preference which the female Aëdes shows when she is seeking a site on which to lay her eggs. Methods for the exact control of such experiments are given, and the authors record experiments with organic infusions, such as

grass and bran, starches, bacteria, etc. The influence of light and darkness, rain, wind, the nature of the surface of the landing-place, the size of the water-containing vessel, water-vapour, temperature, the presence of salt and chemical compounds, the hydrogen-ion concentration, etc., are all factors which are carefully studied.

Section II. "A Study of the Factor which causes the eggs of *Aëdes* to Hatch." Observations are here recorded on the methods employed in the experiments, the normal behaviour, the effect of drying, heating, submerging, stranding, floating, and agitating, the influence of distilled water, salt and organic solutions, including lysol.

Section III. "Experiments with larvae and pupae of *Aëdes variegatus* and *Aëdes argenteus*." The observations deal with the normal mortality, the length of the larval and pupal stages, the relation to temperature, food supply, chemotropisms, salinity, and light and darkness. Experiments on the effect of starvation, poisons, and survival after partial drying are included.

Section IV. "A Short Note on Adults" deals with the proportion of the two sexes. The authors' figures indicate that the sexes hatch from the eggs in approximately equal numbers—an observation which tallies with the records of most other workers.

Section V. "Summary. *Aëdes* and its Environment." As the title of this section indicates, the authors discuss the inferences to be drawn from the previously described experiments. Appendix I. "A Comparison of Certain Elements at the Observatory and the Hospital, Apia" gives further statistical data to observations mentioned in the earlier part of the book. Appendix II. "Malaria and Filariasis in the New Hebrides." Buxton believes that malaria occurs on all the inhabited islands, except Futuna. Filariasis is fairly common, and is of the nocturnal type. Since *Culex fatigans* has only recently been imported to Vila, the authors exonerate it as the vector, and suggest that *Anopheles punctulatus* may very well serve as the intermediate host.

Appendix III. "Is there a General Factor tending to cause the Eggs of *Aëdes variegatus* in different experimental pots to hatch on certain days?" by J. F. C. Haslam. The author of this appendix, after describing 29 experiments undertaken in connexion with the investigation, concludes: "it is apparent that no support for the postulation of such a factor can be derived from the material under study." Appendix IV. "Distribution of Hatching Times of *Aëdes variegatus*," by M. Greenwood and E. M. Newbold, furnishes a statistical and mathematical study. The authors state: "There is no apparent consistent correlation between the hatching rate on any day, and the proportion of eggs hatched on previous days. Only two out of the nine experiments suggest a positive association."

The book concludes with a bibliography of four pages and a good index.

Buxton and Hopkins have not actually brought to light any of the elusive factors governing the development and bionomics of mosquitoes, but they have well illuminated the region in which these factors lie hidden, and in consequence future workers should to some extent find the search less arduous.

M. E. MacGregor.

Covell (G.) [M.D., Major I.M.S.]. **A Critical Review of the Data Recorded regarding the Transmission of Malaria by the Different Species of Anopheles; with Notes on Distribution, Habits and Breeding-Places.**—*Indian Med. Res. Memoirs.* Supplementary Series to *Indian Jl. Med. Res.* 1927. July. Memoir No. 7. 117 pp. [329 refs.] [Central Malaria Bureau, Kasauli.]

Imagination falters in the attempt to realize the amount of patient and discriminative work that this unpretentious but invaluable compilation represents. What the author has done is to collate and summarize the

results recorded up to the present day, of the manifold investigations carried on in all quarters of the globe on the subject of the transmission of malaria by specific anopheline mosquitoes; and he gives us here the result of his own labours, in the very convenient form of a list of Anopheles species, arranged in alphabetic order, where exact particulars of distribution, breeding-places, and habits are given (so far as the record goes) for each species, while, as regards those species whose reaction to the malaria parasite has been ascertained by observation, particulars are given, for each such species, of the name and venue of every observer and of the details of his series of observations in nature and in the laboratory.

In his introduction the author emphasizes the commonsense proposition [applicable not only to Anopheles, but to all species of arthropods similarly pathogenous], that in estimating the adequacy of a species as an actual transmitter of parasites to man, it is not quite sufficient to discover that the parasites can develop in that species—it must be ascertained that they can complete their development there; equally essential to a correct estimate is the knowledge whether or not the given species is both common and generally abundant, and whether or not it habitually haunts houses (or regularly visits them from the jungle) in order to attack mankind. Another point emphasized by the author is that, where in one particular place a species has been proved by conclusive observations to be a natural transmitter, the knowledge must not be applied, unhesitatingly, beyond its venue, since a given species may be a natural transmitter in one part of its range and not in another; of which phenomenon several instances are given.

The 31 species herein following are those that have been proved by actual observation to be susceptible to malaria parasites. In each case the author gives, so far as the records carry him, the observer's name, date, and country of observation, the number of insects examined and the number (and percentage) found infected, the organ infected (gut or stomach or both), and in the case of experimental observations, the species of parasite employed.

1. Species found infected both in nature and experimentally *Anopheles aconitus, barbirostris, bifurcatus, crucians, culicifacies, fuliginosus, funestus, hyrcanus* (=*sinensis*), *karwari, kochii, leucosphyrus, ludlowii, maculatus, maculipennis, minimus, punctipennis, quadrimaculatus, stephensii, subpictus* (=*rossii*) with some qualifications to be noted, *superpictus* (=*palestinensis* of Theobald), *tarsimaculatus, tessellatus, umbrosus,* and *vagus*.

2. Species found infected only in nature: *A. albitarsis, argyrotarsis, gambiae* (=*costalis* of many writers), and *listonii*.

3. Species experimentally infected only: *A. albimanus, plumbeus,* and *willmorii*.

The names of species are mainly those authorized by CHRISTOPHERS in his *Provisional List and Catalogue of the Anophelini*.

A. Alcock.

COCHRANE (Robert G.). [M.B., Ch.B., M.R.C.P. (London), D.T.M.& H., Medical Adviser, Mission to Lepers.] **Leprosy in India. A Survey.**—22 pp. With 1 map. 1927. London: World Dominion Press, 1, Tudor Street, E.C.4. [2s.]

This comprehensive survey reviews the provision for the treatment of lepers in the separate provinces of India. The numbers disclosed by the census of 1921 should be multiplied eight to ten times to give a proper realization of the true incidence of the disease. The belief that humidity of climate plays some part in the prevalence of leprosy is confirmed by the high figures from such districts as the Malabar coast and Burma compared with those from Rajputana. The hill districts are probably most leprous on account of the uncleanly habits of the hill-people and owing to their

customary crowding into small ill-ventilated dwellings. Concerning the different provinces, leper work in Bengal is inadequate. While Bihar and Orissa are better provided than most provinces, the need of a medical centre for instruction—at Purulia for instance—is noted. The leper incidence in Punjab, excluding the hill districts, is very low. The home at Tarn Taran, near the sacred town of Amritsar, has gained a local reputation among the lepers. In the hill districts geographical and racial difference make institutional treatment difficult, also the fact that these areas are divided into numerous small native states whose inhabitants are primitive and ignorant. Prejudice in such districts might be overcome by travelling dispensaries. In Bombay the home at Nasik, one of the most sacred towns of India, attracts many lepers. It is suggested that the home at Miraj might well be used for teaching purposes. The leprosy service in this province to be efficient requires centres situated so as to cater for the most leprous areas, particularly to the east of the Ghats. With regard to Travancore with its high leprosy incidence (0·5 per mille) " little is being done really to meet the situation." In Hyderabad there is only one home, a model of its kind, with the best facilities for treating early cases and for instruction. In Assam " the actual situation with regard to the disease is imperfectly known and needs further survey." Burma is heavily infected, especially on the moist west coast. The four existing institutions are to date mostly concerned with the old advanced cases, while " they could be centres for the starting of an efficient anti-leprosy organization."

The medical report of the Mission to Lepers and the proposals of the British Empire Leprosy Relief Association are quoted. The policy approved by the Mission to Lepers requires in each province : (1) an institution in which early cases will be adequately treated ; (2) adequate supervision of the smaller homes ; (3) opportunity for the training for leper work. In the organization of an efficient service on such lines this brief survey should prove of useful value. A blank map is appended depicting each province with its respective leper stations charted and showing also its individual incidence of disease.

W. Jenkins Oliver.